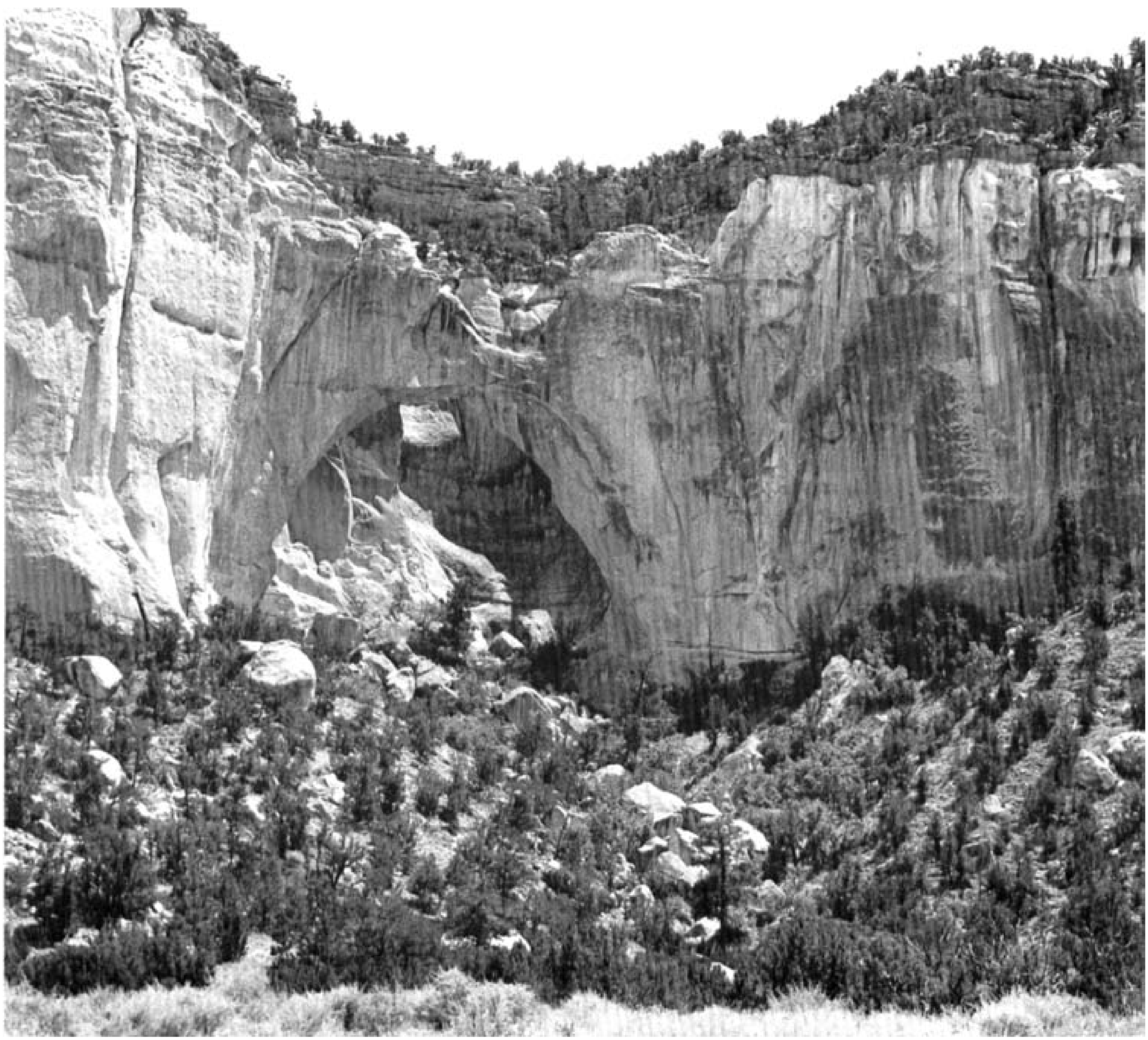
United States Department of Agriculture

Soil Conservation Service

In cooperation with United States Department of the Interior, Bureau of Indian Affairs and Bureau of Land Management, and New Mexico Agricultural Experiment Station

Soil Survey of Cibola Area, New Mexico,

Parts of Cibola, McKinley, and Valencia Counties



How To Use This Soil Survey

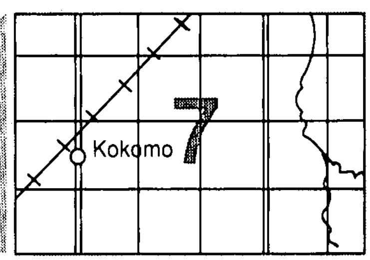
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

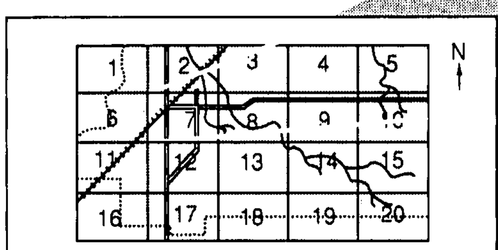
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



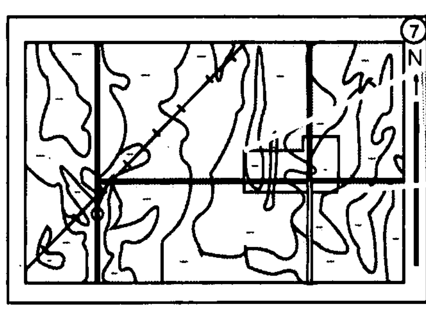
MAP SHEET

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



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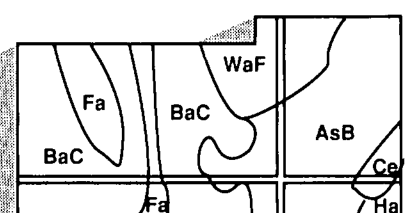

AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1984. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service; United States Department of the Interior, Bureau of Indian Affairs and Bureau of Land Management; and the New Mexico Agricultural Experiment Station. It is part of the technical assistance furnished to the Lava, McKinley, Quemado, and Valencia Soil and Water Conservation Districts.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, sex, religion, marital status, handicap, or age.

Cover: La Ventana, a sandstone landmark east of The Narrows, in an area of Rock outcrop-Vessilla-Mion complex, 3 to 55 percent slopes.

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Issued March 1993

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Summary of Tables

Foreword

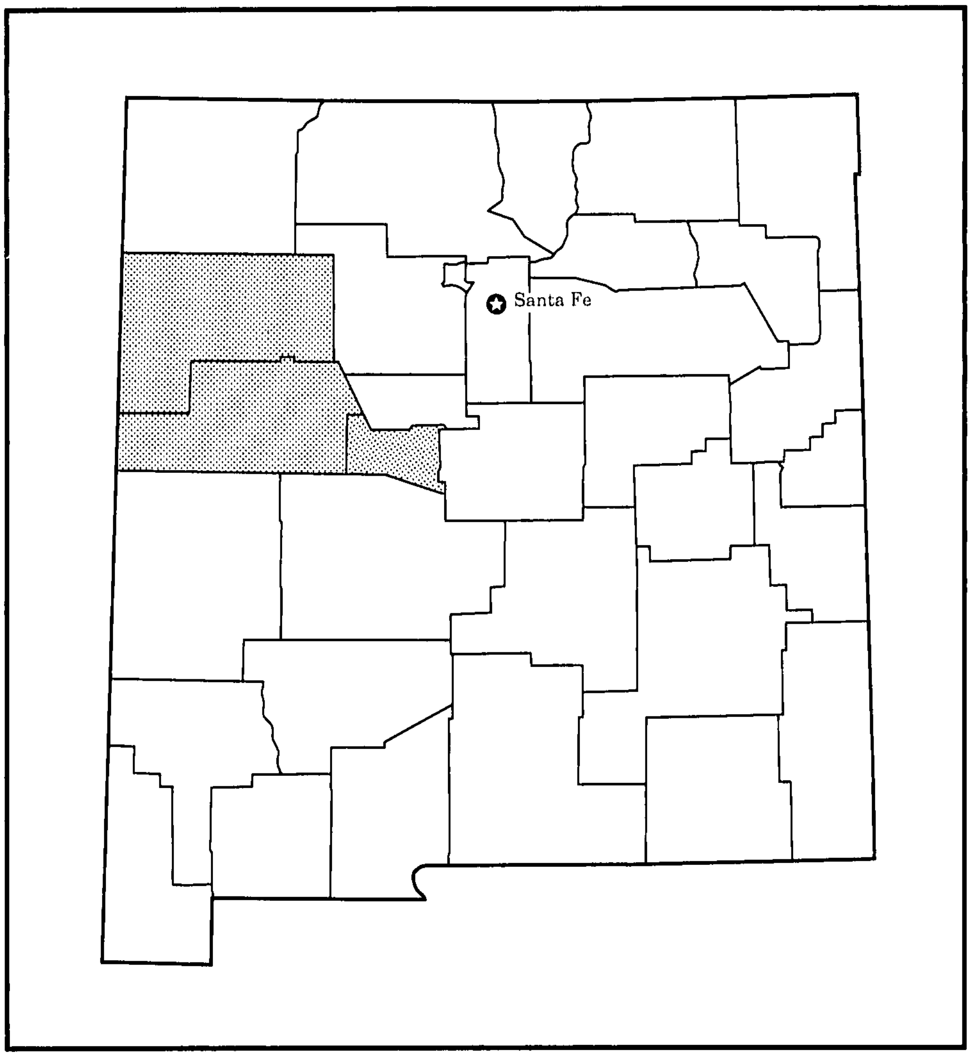
This soil survey contains information that can be used in land-planning programs in the survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Ray T. Margo, Jr.
State Conservationist
Soil Conservation Service



Location of Cibola Area in New Mexico.

Soil Survey of Cibola Area, New Mexico,
Parts of Cibola, McKinley, and Valencia Counties

By Tommie Lee Parham, Soil Conservation Service

Fieldwork by Tommie Lee Parham, Clarence L. Chavez, Clarence E. Montoya, Michael W. Roybal, and Jon K. Melhus, Soil Conservation Service, and William M. Rigdon, Bureau of Indian Affairs

Vegetative work by Michael J. Delancey and Richard J. Reioux, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
United States Department of the Interior, Bureau of Indian Affairs and Bureau of Land Management, and New Mexico Agricultural Experiment Station

This survey area is in the west-central part of New Mexico. It has a total area of 2,696,480 acres, or about 4,213 square miles. In 1980, Cibola County had a population of 30,109 and Grants, the largest city in the survey area, had a population of about 11,635. Grants became the county seat when Cibola County was established in 1981. The county was originally part of Valencia County.

Elevation in the survey area ranges from about 5,250 feet in an area near the Rio Puerco to 10,300 feet in an area north of Water Canyon, near Mount Taylor. Most areas are at elevations of 6,000 to 8,000 feet.

The eastern one-fifth of the survey area is mainly rangeland and does not support trees. It is characterized by limestone and gypsum hills and a few basalt-capped mesas.

The western part of the survey area, which is within the Colorado Plateau physiographic province, generally is characterized by rough, broken terrain, including small, steep mountainous areas, plateaus, and mesas intermingled with steep canyon walls, escarpments, and valleys.

The part of the survey area that has been subject to the most volcanic activity extends from Mount Taylor to the southwestern corner of the survey area. This part includes numerous volcanic plugs, such as Bandera Crater and Cerro Alto.

The survey area has very little surface water. The major bodies of water are Bluewater and Ramah Lakes (fig. 1). The Rio San Jose, in the central part of the area, and the Rio Puerco, in the eastern part, are the major tributaries.

Precipitation in the survey area varies with elevation. It ranges from about 7 inches in one of the lowest areas near the Rio Puerco to 25 inches east of Mount Taylor, the highest mountain in the area.

Coal mining, commercial woodcutting, and ranching are the most important enterprises in the survey area. Uranium mining formerly was important, but a decrease in demand has resulted in the closing of most uranium mines in the area. The ranches are mainly cow-calf enterprises, but some are yearling enterprises. Parts of the Bluewater Valley, the San Mateo area, the Grants-Milan area, the Seboyeta-Bibo area, and the Ramah Valley are used for farming. The survey area has about 4,500 acres of irrigated cropland and 1,500 acres of nonirrigated cropland. The main crops are alfalfa hay, corn, and wheat. Other crops include vegetables, orchard crops, and Irish potatoes. Some areas are used as irrigated pasture.

Parts of this survey area were included in the soil surveys of the Bluewater Area, New Mexico, published in 1958, and the Zuni Mountain Area, New Mexico, published in 1967. This survey updates the earlier surveys. It provides additional information and has larger maps, which show the soils in greater detail.

Figure 1.—Bluewater Lake, in the northwestern part of the survey area, is a popular recreation area in New Mexico.

Climate

Prepared by the State Climatologist, Las Cruces, New Mexico.

The average annual precipitation in this survey area generally ranges from about 9 inches at elevations of less than 6,000 feet to more than 12 inches at elevations of about 7,000 feet. The higher mountain peaks receive as much as 25 inches or more. The amounts can vary greatly from year to year. For example, San Fidel received a total of 22.41 inches in 1941, but Laguna received only 1.96 inches in 1956. The highest monthly total, recorded at the El Morro National Monument in August 1947, was 8.93 inches.

The average number of days with 0.1 inch or more of precipitation ranges from 25 at the lower elevations to 40 or more at the higher elevations. Generally, 3 to 6 days a year receive at least 0.5 inch of precipitation.

The rainy season is in summer. About half of the average annual precipitation falls during the period July through September, mostly during brief thunderstorms that are sometimes heavy. The thunderstorms are occasionally accompanied by hail and strong, gusty winds. Nearly three-fourths of the annual precipitation falls during the period May through October.

The main source of moisture in summer is the Gulf of Mexico. Moisture is carried into New Mexico by southeasterly winds from the Bermuda high pressure area. Occasionally, some moisture also is received from the eastern subtropical Pacific. In winter most of the precipitation is from storms that originate in the Pacific Ocean and move inland. Because much of the moisture from these storms is removed by the mountains to the west of New Mexico, precipitation generally is light in winter.

The average annual snowfall ranges from about 1 foot at the lower elevations to 4 feet or more at the higher elevations. In the winter of 1974-75, a total of 102.8 inches of snow fell at the El Morro National Monument. Most of the snow falls during the period November through March, but it can fall as late as May at the higher elevations.

The average annual temperature ranges from about 54 degrees F at the lower elevations to about 47 degrees at the higher elevations. It may be even lower, however, in the highest mountainous areas. The diurnal temperature range is quite wide. It averages about 33 degrees. The highest recorded temperature is 104 degrees, which occurred at San Fidel on July 7, 1966, and the lowest is -38 degrees, which occurred at the El Morro National Monument on January 13 and 15, 1963. The average number of days when temperatures of 90 degrees or higher occur ranges from about 50 per year at the lower elevations to 15 or less at the higher elevations. The average number of days with freezing temperatures ranges from 150 at the lower elevations to 200 or more at the higher elevations. The average number of days when temperatures of zero or below occur ranges from 2 at the lower elevations to 11 or more at the higher elevations.

The freeze-free period ranges from about 110 days at the El Morro National Monument, which has an elevation of 7,225 feet, to 156 days at Laguna, which has an elevation of 5,800 feet. The sun shines an average of 3,100 hours annually, or 70 percent of the time possible. The range is 65 percent of the time possible in January to 75 percent in July. At the El Morro National Monument, the relative humidity averages 77 percent early in the morning. It averages 39 percent in the afternoon during all months of the year, except for June, when it averages only about 25 percent. Estimated evaporation ranges from about 50 inches per year at the higher elevations to 60 inches per year at the lower elevations. The average annual windspeed is 10 miles per hour at Acomita. The windiest period is in March. The winds are most frequently from the west.

Table 1 gives temperature and precipitation data as recorded at Grants and Laguna.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils

systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general map units in this survey have been grouped for broad interpretive purposes. Each of the broad groups and the map units in each group are described on the following pages.

Soil Descriptions

Lava Flows, Dry Soils, and Rock Outcrop in Areas of Hills, Mesas, Ridges, Valleys Between Lava Ridges, Cuestas, Fan Terraces, and Swales

This group consists of six map units. It makes up about 23 percent of the survey area. The native vegetation is grasses, shrubs, and scattered trees. Elevation is 5,800 to 7,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 115 to 145 days.

The soils in this group formed in alluvial and eolian material. They are used mainly for livestock grazing and wildlife habitat.

1. Lava Flows-Viuda

Lava flows and shallow soils, mainly on hills and ridges

This map unit is mainly on hills and ridges in the central part of the survey area. Slope is 1 to 15 percent. The vegetation is mainly grasses, shrubs, and scattered trees. Elevation is 6,200 to 7,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 115 to 145 days.

This unit makes up about 3.3 percent of the survey area. It is about 85 percent Lava flows and similar miscellaneous areas, 10 percent Viuda and similar soils, and 5 percent soils of minor extent.

Lava flows occur as barren or nearly barren areas of exposed lava. They have very sharp, jagged surfaces. Vegetation generally is limited to cracks and crevasses and included soils.

Viuda soils are on hills and ridges. These soils are shallow and well drained. They formed in alluvium and windblown sediments over basalt. Typically, the surface layer is brown very cobbly sandy loam about 3 inches thick. The subsoil is about 16 inches of brown and light brown clay and cobbly clay loam. Basalt is at a depth of about 19 inches.

Of minor extent in this unit are the deep Penistaja and moderately deep Hagerman soils in valleys between lava ridges.

This unit is used for livestock grazing and wildlife habitat. The main limitations are the rough, broken terrain, the depth to bedrock, rock outcrops, a restricted rooting depth, and stones on the surface. The vegetation is sparse.

This unit of limited grassland supports a diverse plant community of shrubs and junipers, which enhance the habitat for wildlife. Local areas receive surface runoff and support a more dense shrub or woodland habitat. Characteristic wildlife include coyote, bobcat, gray fox, cottontail, wood rat, rock wren, brown towhee, chipping sparrow, short-horned lizard, and black-tailed rattlesnake.

2. Poley-Rock Outcrop-Flaco

Moderately deep and deep soils and Rock outcrop, mainly on hills, ridges, and mesas

This map unit is mainly on hills, ridges, and mesas in the southeastern and south-central parts of the survey area. Slope is 1 to 25 percent. The vegetation is mainly

grasses, shrubs, and scattered juniper. Elevation is 5,900 to 7,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 145 days.

This unit makes up about 6.9 percent of the survey area. It is about 40 percent Poley and similar soils, 25 percent Rock outcrop, 20 percent Flaco and similar soils, and 15 percent soils of minor extent. Areas near the Socorro County line may have a higher percentage of minor soils.

Poley soils are on hills and ridges. These soils are deep and well drained. They formed in alluvium and colluvium derived dominantly from shale. Typically, the surface layer is reddish brown very cobbly loam about 3 inches thick. The upper part of the subsoil is reddish brown and yellowish red clay about 19 inches thick, and the lower part to a depth of 60 inches or more is light reddish brown and pink clay and clay loam.

Rock outcrop consists of barren or nearly barren areas of exposed basalt and sandstone.

Flaco soils are on basalt-capped mesas. These soils are moderately deep and well drained. They formed in mixed alluvium and windblown sediments. Typically, the surface layer is yellowish brown loam about 2 inches thick. The subsoil is about 27 inches thick. The upper 9 inches is yellowish brown loam and clay loam, and the lower 18 inches is yellowish brown and light yellowish brown clay loam and loam. Unweathered basalt is at a depth of about 29 inches.

Of minor extent in this unit are the shallow Berto soils on mesa tops, the moderately deep Hagerman and deep Harvey and Penistaja soils on mesas, the deep Pojoaque and Rana soils on mesa breaks, and the shallow Mion soils on hills.

This unit is used for livestock grazing and wildlife habitat. The main limitations are the Rock outcrop, the depth to bedrock in the Flaco soils, and the clayey texture of the Poley soils.

The ledges and rocky areas in this unit provide habitat for some kinds of wildlife. The unit supports a plant community of grasses, shrubs, and scattered juniper. Characteristic wildlife include coyote, cottontail, bobcat, wood rat, rock squirrel, flycatcher, wren, and crow. Most areas support only a few mule deer, but larger populations are on Sierra Lucero.

3. Viuda-Penistaja

Shallow and deep soils, mainly on hills and ridges and in valleys between lava ridges

This map unit is mainly on hills and ridges and in valleys between lava ridges in the south-central part of the survey area. Slope is 1 to 12 percent. The vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit makes up about 2.9 percent of the survey area. It is about 40 percent Viuda and similar soils, 35 percent Penistaja and similar soils, and 25 percent components of minor extent. Areas near the Catron County line may have a higher percentage of some minor components.

Viuda soils are on hills and ridges. These soils are shallow and well drained. They formed in alluvium and windblown sediments. Typically, the surface layer is brown very cobbly sandy loam about 3 inches thick. The subsoil is about 16 inches of brown clay and light brown cobbly clay loam. Unweathered basalt is at a depth of about 19 inches.

Penistaja soils are on ridges and in valleys between lava ridges. These soils are deep and well drained. They formed in wind-modified, mixed alluvium. Typically, the surface layer is brown sandy loam about 2 inches thick. The upper part of the subsoil is strong brown sandy clay loam about 20 inches thick. The lower part of the subsoil and the substratum to a depth of 60 inches are light brown and reddish brown sandy loam.

Of minor extent in this unit are Rock outcrop on lava ridges, the deep Aparejo and Venadito soils in valleys, and the deep Ildefonso soils on ridges.

This unit is used for livestock grazing and wildlife habitat. The main limitations are the depth to bedrock and rock fragments on the surface in areas of the Viuda soils.

This unit, which is referred to as the North Plains, is a large, open area of grassland that supports extensive stands of snakeweed and rubber rabbitbrush. Small, shallow playas retain surface water during wet periods.

This unit provides good habitat for pronghorn antelope. Other characteristic wildlife include black-tailed jackrabbit, coyote, ground squirrel, horned lark, golden eagle, and loggerhead shrike. During wet periods migrating waterfowl and shore birds frequent the shallow playas.

4. Hagerman-Rock Outcrop-Mion

Shallow and moderately deep soils and Rock outcrop, mainly on mesas, cuestas, hills, and ridges

This map unit is mainly on mesas, cuestas, hills, and ridges in the northeastern part of the survey area. Slope is 1 to 65 percent. The vegetation is mainly grasses, shrubs, and scattered oneseed juniper. Elevation is

6,000 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit makes up about 6.1 percent of the survey area. It is about 40 percent Hagerman and similar soils, 25 percent Rock outcrop, 15 percent Mion and similar soils, and 20 percent components of minor extent. Areas near the Bernalillo County line may have a higher percentage of some minor components.

Hagerman soils are on mesas and cuestas. These soils are moderately deep and well drained. They formed in eolian and alluvial material derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsurface layer is dark brown fine sandy loam about 3 inches thick. The upper part of the subsoil is brown sandy clay loam about 17 inches thick, and the lower part is strong brown and light brown sandy loam about 11 inches thick. Sandstone is at a depth of about 34 inches.

Rock outcrop consists of barren or nearly barren areas of exposed sandstone and shale on hills and ridges.

Mion soils are on hills and ridges. These soils are shallow and well drained. They formed in alluvium and colluvium derived dominantly from shale. Typically, the surface layer is light olive brown stony loam about 3 inches thick. The underlying material is about 10 inches of grayish brown silty clay and silty clay loam. Shale is at a depth of about 13 inches.

Of minor extent in this unit are the shallow Bond and Skyvillage soils on cuestas and mesas, Badland on hills and ridges, and the deep Penistaja soils on cuestas.

This unit is used for livestock grazing and wildlife habitat. The main limitations are the depth to bedrock, the slope, and the Rock outcrop.

This unit provides grassland habitat that supports only scattered oneseed juniper. Characteristic wildlife include coyote, black-tailed jackrabbit, prairie dog, mourning dove, toad, and prairie rattlesnake.

5. Winona-Rock Outcrop-Tanbark

Shallow and very shallow soils and Rock outcrop, mainly on mesas, hills, and ridges

This map unit is on mesas, hills, and ridges in the southeastern part of the survey area. Slope is 1 to 60 percent. The vegetation is mainly grasses and shrubs. Elevation is 5,800 to 6,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit makes up about 1.9 percent of the survey area. It is about 40 percent Winona and similar soils, 25 percent Rock outcrop, 20 percent Tanbark and similar soils, and 15 percent soils of minor extent. Areas near the Socorro County line may have a higher percentage of minor soils.

Winona soils are on mesas, hills, and ridges. These soils are shallow or very shallow and are well drained. They formed in windblown sediments derived dominantly from limestone. Typically, the surface layer is brown very gravelly loam about 3 inches thick. The subsoil is pale brown and very pale brown very cobbly loam about 7 inches thick. Unweathered limestone is at a depth of about 10 inches.

Rock outcrop consists of barren or nearly barren areas of exposed limestone on hills and ridges.

Tanbark soils are on ridges and hills. These soils are shallow and well drained. They formed in eolian material derived dominantly from gypsum. Typically, the surface layer is very pale brown loam about 2 inches thick. The underlying material is about 15 inches of very pale brown and white, gypsiferous silt loam and sandy loam. Unweathered gypsum is at a depth of about 17 inches.

Of minor extent in this unit are the deep Harvey soils on mesa tops, the shallow Rizozo and Mion soils on hills, and the deep Oelop soils in swales.

This unit is used for livestock grazing and wildlife habitat. The main limitations are the slope, the depth to bedrock, and the content of gypsum in the Tanbark soils.

This unit consists of desert grassland that includes areas of sparse shrubs along drainageways and areas that are barren and eroded. The unit provides fair habitat for pronghorn antelope, but the habitat for mule deer is very poor. Characteristic wildlife include coyote, badger, kangaroo rat, black-tailed jackrabbit, prairie lark, scaled quail, and prairie rattlesnake.

6. Harvey-Netoma-Oelop

Deep soils, mainly on mesas, fan terraces, and hills and in swales

This map unit is on mesas, fan terraces, and hills and in swales in the southeastern part of the survey area. Slope is 0 to 12 percent. The vegetation is mainly grasses and shrubs. Elevation is 5,800 to 6,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit makes up about 1.7 percent of the survey area. It is about 35 percent Harvey and similar soils, 25

percent Netoma and similar soils, 20 percent Oelop and similar soils, and 20 percent soils of minor extent. Areas near the Socorro County line and the Valencia County line may have a higher percentage of minor soils.

Harvey soils are on mesas. These soils are deep and well drained. They formed in mixed alluvium and windblown sediments. Typically, the surface layer is brown loam about 2 inches thick. The upper part of the subsoil is reddish yellow and light brown clay loam about 16 inches thick, and the lower part to a depth of 60 inches is pink loam.

Netoma soils are on fan terraces and hills. These soils are deep and well drained. They formed in alluvium derived dominantly from gypsiferous material. Typically, the surface layer is strong brown sandy loam about 4 inches thick. The upper part of the subsoil is strong brown sandy loam about 8 inches thick, and the lower part to a depth of 60 inches is light brown and reddish yellow, gypsiferous sandy loam.

Oelop soils are in swales. These soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is dark yellowish brown loam about 3 inches thick. The upper part of the subsoil is dark yellowish brown clay loam about 13 inches thick, and the lower part to a depth of 60 inches is dark yellowish brown clay loam and loam.

Of minor extent in this unit are the deep Penistaja soils on cuestas, the shallow Bond and Rizozo soils on hills and ridges, and the gypsiferous Tanbark and Saido soils on hills and plains.

This unit is used for livestock grazing and wildlife habitat. The main limitations are the high content of calcium carbonate in the Harvey soils and the high content of gypsum in the Netoma soils.

This unit consists of desert grassland that includes areas of sparse shrubs along drainageways and areas that are barren and eroded. The unit provides fair habitat for pronghorn antelope, but the habitat for mule deer is very poor. Characteristic wildlife include coyote, badger, kangaroo rat, meadowlark, prairie lark, scaled quail, and prairie rattlesnake.

Moist Soils and Rock Outcrop in Areas of Hills, Ridges, Mesas, Fan Terraces, Alluvial Fans, Valleys Between Lava Ridges, Other Valleys, and Plateaus

This group consists of six map units. It makes up about 51 percent of the survey area. The native vegetation is pinyon, juniper, shrubs, and grasses. Elevation is 6,400 to 7,500 feet. The average annual precipitation is about 12 to 16 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 100 to 135 days.

The soils in this group formed in alluvial and eolian material. They are used mainly for livestock grazing, fuel wood production, and wildlife habitat.

7. Laporte-Rock Outcrop

Shallow soils and Rock outcrop, mainly on hills and ridges

This map unit is on hills and ridges in the central part of the survey area. Slope is 1 to 60 percent. The vegetation is mainly trees, shrubs, and an understory of grasses. Elevation is 6,500 to 7,200 feet. The average annual precipitation is about 12 to 15 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 110 to 135 days.

This unit makes up about 2.3 percent of the survey area. It is about 50 percent Laporte and similar soils, 35 percent Rock outcrop, and 15 percent soils of minor extent.

Laporte soils are on hills and ridges. These soils are shallow and well drained. They formed in mixed colluvium and windblown sediments. Typically, the surface layer is dark brown gravelly loam about 3 inches thick. The underlying material is dark grayish brown gravelly loam about 8 inches thick. Limestone is at a depth of about 11 inches.

Rock outcrop consists of barren or nearly barren areas of exposed limestone on hills and ridges.

Of minor extent in this unit are the moderately deep Celacy soils on hills; the shallow Atarque, Mion, and Vessilla soils on hills and ridges; and the deep Flugle and Goesling soils on hills.

This unit is used for livestock grazing, limited wood products, and wildlife habitat (fig. 2). The main limitations are the slope, the depth to bedrock, and the windthrow hazard.

This unit of rocky hillsides and ledges provides brushy habitat for mule deer, cottontail, bobcat, ring-tailed cat, scrub jay, great horned owl, chickadee, and raven. Areas in and around Bluewater Lake and Bluewater Creek provide aquatic and riparian habitat for coot, herons, mallard, teal, muskrat, raccoon, toads, and frogs.

8. Flugle-Catman-Rock Outcrop

Deep soils and Rock outcrop, mainly on mesas, fan terraces, and alluvial fans and in valleys

This map unit is on mesas, fan terraces, and alluvial fans and in valleys in the western and south-central parts of the survey area (fig. 3). Slope is 1 to 8 percent. The vegetation is mainly grasses, shrubs, and trees. Elevation is 6,400 to 7,300 feet. The average annual

Figure 2.—Typical area of the Laporte-Rock outcrop general soil map unit, near Bluewater Lake. This unit provides brushy habitat for a variety of wildlife.

precipitation is about 11 to 14 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 115 to 135 days.

This unit makes up about 19.2 percent of the survey area. It is about 40 percent Flugle and similar soils, 25 percent Catman and similar soils, 15 percent Rock outcrop, and 20 percent soils of minor extent. Areas near the Catron County line may have a higher percentage of some minor soils.

Flugle soils are on mesas and fan terraces. These soils are deep and well drained. They formed in wind-modified alluvium. Typically, the surface layer is brown loamy fine sand about 5 inches thick. The upper part of the subsoil is strong brown and brown sandy clay loam about 22 inches thick, and the lower part to a depth of 60 inches is light brown and pink sandy clay loam and sandy loam.

Catman soils are on alluvial fans and in valleys.

These soils are deep and well drained. They formed in alluvium derived dominantly from shale. Typically, the surface layer is light olive brown clay loam about 3 inches. The underlying material to a depth of 60 inches is light olive brown clay.

Rock outcrop consists of barren or nearly barren areas of exposed sandstone and shale on the edges of mesas.

Of minor extent in this unit are the deep Moncha, Goesling, and Teco soils on mesas and fan terraces; the deep Venadito, Hickman, and Catman Variant soils in valleys and on flood plains; the shallow Mion and Vessilla soils on hills; the shallow Atarque and moderately deep Celacy soils on mesas; and the deep Silkie soils on valley sides.

This unit is used for livestock grazing, fuel wood production, and wildlife habitat.

This unit is mainly grassland that supports only scattered shrubs and juniper. Sagebrush and greasewood are the dominant plants on the eroded bottom of some drainageways. Areas of wetland and riparian habitat are along Cebolla Creek. Areas of Catman Variant soils, which have a high water table, provide riparian habitat. Areas of nonirrigated and irrigated cropland contribute to the diverse habitat in this unit.

Characteristic wildlife include pronghorn antelope, black-tailed jackrabbit, coyote, prairie dog, ground squirrel, meadowlark, prairie lark, and prairie rattlesnake. The wildlife in the aquatic areas include

Figure 3.—Typical area of the Flugle-Catman-Rock outcrop general soil map unit.

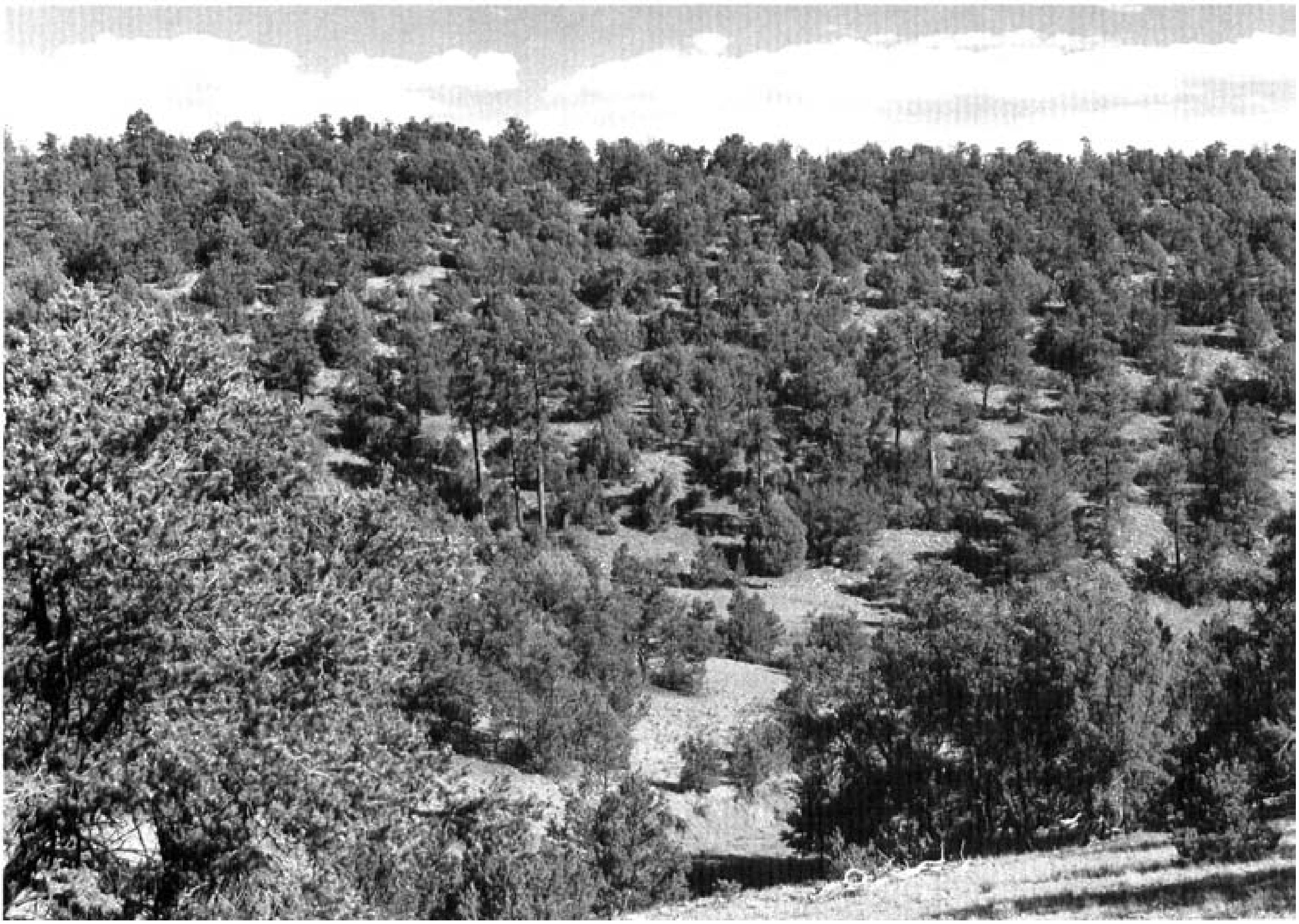


Figure 4.—Typical area of the Pinitos-Galestina-Mion general soil map unit.

muskrat, raccoon, rail, blackbird, coot, leopard frog, and garter snake.

9. Pinitos-Galestina-Mion

Shallow and deep soils, mainly on mesas, hills, and ridges

This map unit is on mesas, hills, and ridges in the western and south-central parts of the survey area (fig. 4). Slope is 1 to 55 percent. The vegetation is mainly trees, grasses, and shrubs. Elevation is 6,800 to 7,500 feet. The average annual precipitation is about 13 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

This unit makes up about 12.7 percent of the survey area. It is about 35 percent Pinitos and similar soils, 25 percent Galestina and similar soils, 20 percent Mion and similar soils, and 20 percent components of minor extent. Areas near the Catron County line and the Socorro County line may have a higher percentage of some minor components.

Pinitos soils are on mesas and hills. These soils are deep and well drained. They formed in wind-modified alluvium. Typically, the surface layer is light brown sandy loam about 2 inches thick. The upper part of the subsoil is brown and light brown sandy clay loam about 22 inches thick, and the lower part to a depth of 60 inches is light yellowish brown sandy loam.

Galestina soils are on hills and mesas. These soils are deep and well drained. They formed in alluvium derived dominantly from shale. Typically, the surface layer is yellowish brown sandy loam about 2 inches thick. The subsurface layer is yellowish brown loam

about 5 inches thick. The upper 24 inches of the subsoil is yellowish brown clay, and the lower 15 inches is yellowish brown and light yellowish brown clay and clay loam. Shale is at a depth of 46 inches.

Mion soils are on ridges. These soils are shallow and well drained. They formed in colluvium and alluvium derived dominantly from shale. Typically, the surface layer is light olive brown stony loam about 3 inches thick. The underlying material is about 8 inches of grayish brown silty clay and silty clay loam. Shale is at a depth of about 13 inches.

Of minor extent in this unit are the deep Catman and Hickman soils on valley bottoms; the deep Montecito, Loarc, Millpaw, and Teco soils on mesas; the moderately deep Ribera and Nogal soils on mesas; the shallow Vessilla soils on hills; and Rock outcrop on hills and ridges.

This unit is used for fuel wood production, livestock grazing, and wildlife habitat. The main limitations are the clayey texture of the Galestina and Mion soils and the shallow depth of the Mion soils.

This unit provides large areas of brushy habitat on breaks and mesas and scattered areas of oak, ponderosa pine, and large pinyon. Characteristic wildlife include mule deer, fox, bobcat, wood rat, chipmunk, scrub jay, kestrel, turkey, great horned owl, flycatcher, nuthatch, and junco. Areas along the Arizona border provide habitat for a fair number of pronghorn antelope. The habitat for mule deer in this unit is fair in the western part of the survey area but is poor in the areas south and east of Ramah. The area west of Cebollita Mesa provides good winter range for mule deer.

10. Teco-Cabezon

Shallow and deep soils, mainly on mesas and ridges

This map unit is mainly on mesas and ridges in the northwestern part of the survey area. Slope is 1 to 12 percent. The vegetation is grasses, shrubs, and trees. Elevation is 6,600 to 7,100 feet. The average annual precipitation is about 11 to 15 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 110 to 135 days.

This unit makes up about 9.3 percent of the survey area. It is about 40 percent Teco and similar soils, 40 percent Cabezon and similar soils, and 20 percent soils of minor extent.

Teco soils are on mesas. These soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is light brown fine sandy loam about 6 inches thick. The upper part of the subsoil is reddish brown and brown clay loam about 18 inches thick, and the lower part to a depth of 60 inches is light brown, pink, and reddish yellow clay loam, sandy clay loam, and gravelly sandy loam.

Cabezon soils are on ridges. These soils are shallow and well drained. They formed in windblown sediments and alluvium over basalt. Typically, the surface layer is brown very cobbly loam about 2 inches thick. The subsoil is brown clay about 16 inches thick. Basalt is at a depth of about 18 inches.

Of minor extent in this unit are the shallow Atarque and deep Montecito, Torreon, and Flugle soils on mesas.

This unit is used for livestock grazing, fuel wood production, and wildlife habitat. The main limitations are the stones on the surface and depth to bedrock in areas of the Cabezon soils.

This unit is dominantly grassland. The eroded bottom of some drainageways dominantly supports sagebrush. The area near Ramah provides fair habitat for pronghorn antelope. Characteristic wildlife include black-tailed jackrabbit, prairie dog, ground squirrel, meadowlark, horned lark, marsh hawk, and sage sparrow.

11. Cabezon-Cantina-Millpaw

Shallow and deep soils, mainly on hills and ridges, in valleys between lava ridges, and in other valleys

This map unit is on hills and ridges, in valleys between lava ridges, and in other valleys in the southwestern part of the survey area. Slope is 1 to 10 percent. The vegetation is mainly grasses and trees. Elevation is 6,800 to 7,300 feet. The average annual precipitation is about 13 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

This unit makes up about 5.6 percent of the survey area. It is about 35 percent Cabezon and similar soils, 25 percent Cantina and similar soils, 20 percent Millpaw and similar soils, and 20 percent components of minor extent.

Cabezon soils are on hills and ridges. These soils are shallow and well drained. They formed in windblown sediments and alluvium over basalt. Typically, the surface layer is brown very cobbly loam about 2 inches thick. The subsoil is brown clay about 16 inches thick. Basalt is at a depth of about 18 inches.

Cantina soils are on hills and in valleys between lava ridges. These soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is brown sandy loam about 2 inches thick. The upper 29 inches of the subsoil is brown sandy clay and sandy clay loam, and the lower 23 inches is brown sandy clay loam. Basalt is at a depth of about 54 inches.

Millpaw soils are in valleys. These soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is brown loam about 3 inches thick. The upper 26 inches of the subsoil is dark brown clay loam and clay, the next 12 inches is brown sandy clay loam, and the lower part to a depth of 60 inches is brownish yellow sandy clay loam.

Of minor extent in this unit are the deep, cindery Bandera and Timhus soils on cinder cones, the deep Loarc and Montecito soils on mesas, and Rock outcrop on lava ridges.

This unit is used for livestock grazing, fuel wood production, nonirrigated crops, and wildlife habitat. The main limitations are the depth to bedrock, the rock fragments on and in the Cabezon soils, and the Rock outcrop.

This unit is dominantly grassland that has sizable areas of pinyon and juniper. Some areas are used as nonirrigated cropland. Characteristic wildlife include pronghorn antelope, mule deer, coyote, black-tailed jackrabbit, ground squirrel, marsh hawk, bluebird, crow, and horned lark. The unit provides poor or fair habitat for mule deer.

12. Paguate-Hackroy

Moderately deep and shallow soils, mainly on mesas and plateaus

This map unit is mainly on mesas and plateaus in the northeastern, central, and south-central parts of the survey area. Slope is 1 to 5 percent. The vegetation is mainly grasses, shrubs, and trees. Elevation is 6,400 to 7,000 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 100 to 120 days.

This unit makes up about 2.3 percent of the survey area. It is about 70 percent Paguate and similar soils, 15 percent Hackroy and similar soils, and 15 percent soils of minor extent.

Paguate soils are on mesas and plateaus. These soils are moderately deep and well drained. They formed in alluvium and windblown sediments. Typically, the surface layer is dark brown loam about 3 inches thick. The upper 16 inches of the subsoil is reddish brown clay and clay loam, and the lower 14 inches is pink gravelly clay loam. Unweathered basalt is at a depth of about 33 inches.

Hackroy soils are on mesas and plateaus. These soils are shallow and well drained. They formed in alluvium and windblown sediments. Typically, the surface layer is brown cobbly loam about 3 inches thick. The subsoil is about 11 inches of reddish brown clay loam and clay. Basalt is at a depth of about 14 inches.

Of minor extent in this unit are the deep Catman, Millpaw, and Silkie soils in valleys, the deep Loarc soils on mesas, and the shallow Cabezon soils on ridges.

This unit is used for livestock grazing, fuel wood production, and wildlife habitat. The main limitations are the depth to bedrock, the clayey texture, and the rock fragments on the surface.

This unit generally supports a plant community of pinyon and juniper. Numerous small, seasonal ponds on Cebollita Mesa provide habitat for aquatic wildlife. The La Mesa del Canon Seco, south of Marquez, is an important winter range area for elk. Characteristic wildlife include mule deer, coyote, wood rat, pinyon mouse, porcupine, scrub jay, plain titmouse, shore birds, waterfowl, tiger salamander, toads, and leopard frog.

Dry Soils in Areas of Cuestas, Fan Terraces, Flood Plains, Alluvial Fans, Drainageways, Hills, and Ridges

This group consists of two map units. It makes up about 18 percent of the survey area. The native vegetation is grasses and shrubs. Elevation is 5,400 to 7,000 feet. The annual precipitation is about 7 to 12 inches, the average annual air temperature is 49 to 55 degrees F, and average frost-free period is 115 to 160 days.

The soils in this group formed in alluvial and eolian material. They are used mainly for livestock grazing and wildlife habitat.

13. Penistaja-San Mateo-Sparank

Deep soils, mainly on cuestas, fan terraces, flood plains, and alluvial fans

This map unit is on cuestas, fan terraces, flood plains, and alluvial fans in the north-central and northeastern parts of the survey area. Slope is 1 to 10 percent. The vegetation is mainly grasses and shrubs. Elevation is 6,000 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 115 to 150 days.

This unit makes up about 11.3 percent of the survey area. It is about 40 percent Penistaja and similar soils, 20 percent San Mateo and similar soils, 20 percent Sparank and similar soils, and 20 percent components of minor extent. Areas near the Socorro County line may have a higher percentage of minor components.

Penistaja soils are on cuestas and fan terraces. These soils are deep and well drained. They formed in wind-modified alluvium derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 2 inches thick. The upper part of the

subsoil is brown and strong brown sandy clay loam about 20 inches thick. The lower part of the subsoil and the substratum to a depth of 60 inches are light brown and reddish brown sandy loam.

San Mateo soils are on flood plains and alluvial fans. These soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is light yellowish brown loam about 2 inches thick. The underlying material to a depth of 60 inches is light olive brown loam and sandy clay loam.

Sparank soils are on flood plains and alluvial fans. These soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is light yellowish brown clay loam about 2 inches thick. The underlying material to a depth of 60 inches is light yellowish brown and light olive brown silty clay.

Of minor extent in this unit are the moderately deep Hagerman soils on cuestas; the deep Clovis soils on fan terraces; the deep Aparejo and Venadito soils on flood plains; the deep, somewhat poorly drained Warm Springs soils in old lakebeds; the deep Mespun soils on dunes; and Pits and Dumps on hills and flats.

This unit is used for livestock grazing, irrigated crops, urban development, and wildlife habitat. The main limitations are the hazard of flooding on the San Mateo and Sparank soils and the clayey texture and content of salts in the Sparank soils.

This unit is dominantly grassland that is in poor condition. Shrubs are in drainageways and eroded areas. The downstream reaches of Bluewater Creek and the Rio San Jose traverse the unit and provide degraded aquatic, wetland, and riparian habitat. Springs are in the San Rafael area, which supports emergent wetland vegetation. Areas of nonirrigated and irrigated cropland contribute to the diversity of the habitat in this unit. Characteristic wildlife include black-tailed jackrabbit, pocket gopher, striped skunk, raccoon, prairie dog, meadowlark, swallow, mourning dove, tiger salamander, toads, and garter snake.

14. Navajo-Grieta

Deep soils, mainly on flood plains and alluvial fans, in drainageways, and on fan terraces, hills, and ridges

This map unit is mainly on flood plains and alluvial fans, in drainageways, and on fan terraces, hills, and ridges in the eastern part of the survey area. Slope is 1 to 10 percent. The vegetation is mainly grasses and shrubs. Elevation is 5,400 to 6,000 feet. The average annual precipitation is about 7 to 10 inches, the average annual air temperature is 51 to 55 degrees F, and the average frost-free period is 140 to 165 days.

This unit makes up about 6.5 percent of the survey area. It is about 40 percent Navajo and similar soils, 30 percent Grieta and similar soils, and 30 percent components of minor extent. Areas near the Socorro County line may have a higher percentage of minor components.

Navajo soils are on flood plains and alluvial fans and in drainageways. These soils are deep and well drained. They formed in mixed alluvium. Typically, the surface layer is reddish brown silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches is reddish brown silty clay and clay.

Grieta soils are on fan terraces, hills, and ridges. These soils are deep and well drained. They formed in wind-modified, mixed alluvium. Typically, the surface layer is strong brown sandy loam about 3 inches thick. The upper 25 inches of the subsoil is strong brown sandy loam and sandy clay loam, and the lower part to a depth of 60 inches is pink and pinkish white sandy loam.

Of minor extent in this unit are the shallow Mion soils on hills, the gypsiferous Saido soils on fans and knolls, the deep Sheppard soils on dunes, and Rock outcrop on ridges and hills.

This unit is used for livestock grazing and wildlife habitat. The main limitations are the clayey texture of the Navajo soils and the low precipitation.

This unit is dominantly desert grassland that has scattered shrubs along the drainageways. Characteristic wildlife include coyote, black-tailed jackrabbit, scaled quail, mockingbird, curve-billed thrasher, and bullsnake.

Moist Soils, Lava Flows, and Rock Outcrop in Areas of Basalt Plains, Swales, Ridges, Hills, Mesas, Plateaus, and Mountains

This group consists of three map units. It makes up about 8 percent of the survey area. The native vegetation is mainly ponderosa pine, shrubs, and grasses. Elevation is 7,200 to 10,300 feet. The average annual precipitation is about 16 to 24 inches, the average annual air temperature is 42 to 47 degrees F, and the average frost-free period is 80 to 110 days.

The soils in this group formed in alluvial and eolian sediments. They are used mainly for commercial wood products, livestock grazing, and wildlife habitat.

15. Raton-Lava Flows-Charo

Very shallow, shallow, and moderately deep soils and Lava flows, mainly on basalt plains, in swales, and on ridges

This map unit is mainly on basalt plains, in swales, and on ridges in the central part of the survey area. Slope is 1 to 45 percent. The vegetation is mainly trees. Elevation is 7,200 to 8,300 feet. The average annual precipitation is about 16 to 20 inches, the average

annual air temperature is 40 to 46 degrees F, and the average frost-free period is 90 to 110 days.

This unit makes up about 2.8 percent of the survey area. It is about 30 percent Raton and similar soils, 30 percent Lava flows, 25 percent Charo and similar soils, and 15 percent soils of minor extent.

Raton soils are on basalt plains, in swales, and on ridges. These soils are very shallow or shallow and are well drained. They formed in alluvium and eolian sediments derived dominantly from basalt. Typically, the surface layer is dark reddish brown very cobbly loam about 5 inches thick. The subsoil is reddish brown very cobbly clay about 8 inches thick. Unweathered basalt is at a depth of about 13 inches.

Lava flows occur as barren or nearly barren areas of exposed lava. They have very sharp, jagged surfaces. Vegetation generally is limited to cracks and crevasses and included soils.

Charo soils are in swales. These soils are moderately deep and well drained. They formed in mixed alluvium and windblown sediments. Typically, the surface layer is dark brown loam about 5 inches thick. The subsoil is about 23 inches of reddish brown clay loam and clay. Basalt is at a depth of about 28 inches.

Of minor extent in this unit are the deep Bandera soils on cinder hills and the shallow Borrego soils on basalt-capped mesas.

This unit is used for livestock grazing and wood products. The main limitations are the depth to bedrock, the Lava flows, and the windthrow hazard.

This unit generally is forested with ponderosa pine and some oak brush. Characteristic wildlife include mule deer, coyote, porcupine, Steller's jay, Cooper's hawk, screech owl, hairy woodpecker, and chipmunk.

16. Cinnadale-Valnor-Techado

Shallow and moderately deep soils, mainly on ridges, hills, mesas, plateaus, and mountains

This map unit is mainly on ridges, hills, mesas, plateaus, and mountains in the northwestern and south-central parts of the survey area. It is in the foothills of the Zuni Mountains. Slope is 1 to 25 percent. The vegetation is mainly trees, shrubs, and an understory of grasses. Elevation is 7,500 to 8,900 feet. The average annual precipitation is about 18 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 80 to 100 days.

This unit makes up about 2.1 percent of the survey area. It is about 30 percent Cinnadale and similar soils, 25 percent Valnor and similar soils, 20 percent Techado and similar soils, and 25 percent soils of minor extent. Areas near the Catron County line may have a higher percentage of some minor soils.

Cinnadale soils are on ridges and hills. These soils are shallow and well drained. They formed in alluvium and windblown sediments derived dominantly from siltstone and sandstone. Typically, the surface layer is light reddish brown gravelly very fine sandy loam about 4 inches thick. The subsoil is light reddish brown very channery loam about 8 inches thick. Sandstone is at a depth of about 12 inches.

Valnor soils are on hills, mesas, and plateaus. These soils are moderately deep and well drained. They formed in alluvium derived dominantly from interbedded shale and sandstone. Typically, the surface layer is yellowish brown clay loam about 2 inches thick. The upper part of the subsoil is dark yellowish brown and yellowish brown clay about 16 inches thick, and the lower part is light yellowish brown clay about 20 inches thick. Shale is at a depth of about 38 inches.

Techado soils are on hills, ridges, and mountains. These soils are shallow and well drained. They formed in alluvium and colluvium derived dominantly from shale and sandstone. Typically, the surface layer is light olive brown channery clay loam about 3 inches thick. The underlying material is light olive brown clay about 13 inches thick. Soft shale is at a depth of about 16 inches.

Of minor extent in this unit are the moderately deep Abersito soils on hills; the deep Moreno, Moreno Variant, Saladon, and Yankee soils on fan terraces and in valleys; the deep Kenray soils on dunes; the shallow Stout soils on mountains; and the moderately deep Mirabal soils on hills.

This unit is used for livestock grazing, wildlife habitat, and wood products. The main limitations are the depth to bedrock and the slope.

This unit consists mainly of forests and wet meadows. The area east of Oso Ridge is an important winter range area for mule deer. The northern part of the unit provides range for elk. Characteristic wildlife include coyote, porcupine, chipmunk, tree swallow, raven, chickadee, toads, and frogs. The areas of dense forest provide habitat for black bear.

17. Cebolleta-Charo-Rock Outcrop

Moderately deep soils and Rock outcrop, mainly on hills, mountains, and mesas

This map unit is mainly on hills, mountains, and mesas in the northeastern and central parts of the survey area. Slope is 1 to 15 percent. The vegetation is mainly grasses and trees. Elevation is 7,500 to 10,300 feet. The average annual precipitation is about 18 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 80 to 100 days.

This unit makes up about 3.1 percent of the survey

area. It is about 40 percent Cebolleta and similar soils, 25 percent Charo and similar soils, 15 percent Rock outcrop, and 20 percent soils of minor extent.

Cebolleta soils are on hills, mountains, and mesas. These soils are moderately deep and well drained. They formed in windblown sediments and alluvium. Typically, the surface layer is very dark grayish brown very cobbly loam about 10 inches thick. The subsoil is reddish brown and brown very cobbly clay about 15 inches thick. Basalt is at a depth of about 25 inches.

Charo soils are on mesas and hills. These soils are moderately deep and well drained. They formed in windblown sediments and mixed alluvium. Typically, the surface layer is dark brown loam about 5 inches thick. The subsoil is about 23 inches of reddish brown clay loam and clay. Basalt is at a depth of about 28 inches.

Rock outcrop consists of barren or nearly barren areas of exposed igneous rocks on hills and mountains.

Of minor extent in this unit are the shallow Borrego, Raton, and Techado soils on ridges; the moderately deep Microy soils on hills; and the deep Parkay and Trag soils on mountains.

This unit is used for wood products, livestock grazing, and wildlife habitat. The main limitations are the depth to bedrock, the content of rock fragments, and the Rock outcrop.

This unit is dominantly forested. Several small streams provide aquatic and riparian habitat. Parts of the eastern slopes of Mount Taylor and the Negra and Cebolleta Mesas provide important range for mule deer and winter range for elk. Other characteristic wildlife species include wild turkey, blue grouse, rosy finch, black bear, mountain lion, Aberti's squirrel, chipmunk, Clark nutcracker, and Cooper's hawk.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Penistaja fine sandy loam, 1 to 3 percent slopes, is a phase of the Penistaja series.

Some map units are made up of two or more major soils. These map units are called soil complexes or associations.

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Bond-Penistaja-Rock outcrop complex, 2 to 15 percent slopes, is an example.

A *soil association* is made up of two or more geographically associated soils that are shown as one unit on the maps. Because of present or anticipated soil uses in the survey area, it was not considered practical or necessary to map the soils separately. The pattern and relative proportion of the soils are somewhat similar. Catman-Silkie association, 1 to 10 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Lava flows is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

This survey area was mapped at two levels of detail. At the most detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use.

Table 2 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The "Glossary" defines many of the terms used in describing the soils.

Soil Descriptions

10—Lava flows. This map unit is on old lava plains. Areas are irregular in shape and are 100 to 4,000 acres in size. The vegetation, which is anchored in cracks and

crevices, is mainly grasses, shrubs, and trees. Elevation is 6,000 to 7,600 feet. The average annual precipitation is about 10 to 16 inches, the average annual air temperature is 46 to 54 degrees F, and the average frost-free period is 100 to 150 days.

Lava flows consist of areas of exposed basalt. They have sharp, jagged surfaces, crevices, and angular blocks. They support essentially no vegetation, but the amount and kind of vegetation change with elevation and precipitation.

Included in this unit are small areas of sandy soils that are shallow to basalt, Viuda and Bond soils on lava ridges, Penistaja and Hagerman soils in depressions, and Mespun soils on dunes. Included areas make up about 15 percent of the total acreage.

This unit is used mainly for wildlife habitat and recreation. It is not suitable for grazing by livestock because of the extremely rough, broken terrain and the sparse vegetation. The vegetation on the included soils and anchored in the cracks and crevices is dominantly Apacheplume, skunkbush sumac, sideoats grama, little bluestem, and muttongrass. Scattered oneseed juniper and pinyon are at the lower elevations. Areas at the higher elevations support stands of ponderosa pine and scattered Douglas fir and aspen. The understory is dominantly currant, pine dropseed, Arizona fescue, and mountain muhly. The suitability for wood products is extremely limited because of the rough, broken terrain.

20—Penistaja fine sandy loam, 1 to 3 percent slopes. This deep, well drained soil is on fan terraces. It formed in mixed alluvium and eolian material. Areas are irregular in shape and are 20 to 400 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,700 to 6,600 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature 48 to 53 degrees F, and the average frost-free period is 115 to 140 days.

Typically, the surface layer is strong brown and brown fine sandy loam about 6 inches thick. The upper part of the subsoil is strong brown sandy clay loam about 13 inches thick, and the lower part to a depth of 60 inches is brown and strong brown sandy clay loam. The surface layer is sandy clay loam in some areas.

Included in this unit are small areas of Clovis and Mikim soils on fan terraces. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Penistaja soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main hazard is soil blowing. Stubble and other crop residue can provide protection against soil blowing in spring. Border, furrow, sprinkler, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted crops.

This unit is well suited to urban development. It has few limitations. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees.

A wide variety of trees and shrubs can be grown as windbreaks and environmental plantings on this unit. Cultivation or applications of herbicide can help to remove competing vegetation. Properly designed and managed windbreaks can reduce the risk of soil blowing.

21—Clovis sandy clay loam, 1 to 3 percent slopes. This deep, well drained soil is on fan terraces. It formed in mixed alluvium and eolian material. Areas are irregular in shape and are 30 to 550 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 5,750 to 5,900 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 125 to 140 days.

Typically, the surface layer is dark yellowish brown sandy clay loam about 8 inches thick. The subsoil to a depth of 60 inches or more is sandy clay loam. The upper part is strong brown, and the lower part is pink. A strongly calcareous layer is at a depth of about 21 inches. The surface layer is sandy loam in some areas.

Included in this unit are small areas of Penistaja and Hagerman soils on fan terraces and Mikim soils on fans. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Clovis soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are soil blowing and a high content of calcium carbonate. Stubble and other crop residue can provide protection against soil blowing in spring. Crops that are sensitive to calcium carbonate should not be grown on this unit. Furrow, border, sprinkler, and corrugation irrigation systems are suitable.

If this unit is used for urban development, the main management concerns are soil blowing and a high content of calcium carbonate. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines,

shade trees, or ornamental trees.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of alkalinity and the high content of calcium carbonate, which ties up minerals and limits their availability. Cultivation or applications of herbicide can help to remove competing vegetation. Properly designed and managed windbreaks can reduce the risk of soil blowing. Species that are sensitive to large amounts of calcium carbonate should not be selected for planting.

25—Hickman-Catman complex, 1 to 6 percent slopes. This map unit is in valleys and swales and on alluvial fans. Areas are irregular in shape and are 50 to 1,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,500 feet. The average annual precipitation is about 12 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 115 to 135 days.

This unit is 45 percent Hickman loam, 2 to 6 percent slopes, and 40 percent Catman silty clay loam, 1 to 3 percent slopes. The Hickman soil is in valleys and on alluvial fans, and the Catman soil is on valley bottoms and in swales. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. The soils in some areas near the boundary of Apache County, Arizona, have a higher content of silt.

Included in this unit are small areas of Silkie and Flugle soils on valley sides, Vessilla and Mion soils on hills, and Goesling soils on fan terraces. Included areas make up about 15 percent of the total acreage.

The Hickman soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is pale brown loam about 4 inches thick. The underlying material to a depth of 60 inches is brown and light yellowish brown clay loam, sandy clay loam, loam, and sandy loam.

Permeability is moderately slow in the Hickman soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight. This soil is occasionally flooded for very brief periods in summer.

The Catman soil is deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is dark grayish brown silty clay loam about 4 inches thick. The subsurface layer is grayish brown silty clay loam about 4 inches thick. The underlying material to a depth of 60 inches is brown clay.

Permeability is very slow in the Catman soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight. This soil is slightly saline. It often has cracks in the upper 25 inches. It is occasionally flooded for long periods in summer.

This unit is used for livestock grazing. The potential natural plant community on the Hickman soil is mainly western wheatgrass, alkali sacaton, blue grama, and winterfat. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive. The average annual production of air-dry vegetation ranges from 3,000 pounds per acre in favorable years to 1,200 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, alkali sacaton, spike muhly, and winterfat decrease in abundance and blue grama, galleta, broom snakeweed, and rabbitbrush increase. The increasers generally occur in small amounts in the potential natural plant community.

Good grazing management can increase the productivity and reproduction potential of western wheatgrass, alkali sacaton, Indian ricegrass, and winterfat. The Hickman soil is suited to such management practices as fencing, livestock pipelines, and range seeding. It is not suitable as a site for livestock ponds because of seepage.

The potential natural plant community on the Catman soil is mainly western wheatgrass, spike muhly, alkali sacaton, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 3,200 pounds per acre in favorable years to 1,250 pounds in unfavorable years. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive. If the plant community deteriorates, western wheatgrass, alkali sacaton, and spike muhly decrease in abundance and blue grama, galleta, ring muhly, rabbitbrush, and broom snakeweed increase. The increasers generally occur in small amounts in the potential natural plant community.

Properly managing livestock grazing can protect the Catman soil against water erosion. Deterioration of the plant community on this soil often results in the formation of very deep gullies that drain the site and hinder the production of vegetation. After very deep gullies have artificially drained the site, a combination of grazing management and engineering practices may be required to return the site to its productive potential.

Good grazing management can increase the productivity and reproduction potential of western wheatgrass, spike muhly, and alkali sacaton. The Catman soil is suited to such management practices as fencing, livestock pipelines, livestock ponds, and range seeding.

Good management is needed to protect the soils in this unit against excessive water erosion. If the plant

cover is disturbed, treatment is needed to control sheet erosion and gullying.

30—Warm Springs loam, 0 to 2 percent slopes. This deep, somewhat poorly drained soil is in old lakebeds and on flood plains. It formed in mixed alluvium and lacustrine material. Areas are irregular in shape and are 75 to 200 acres in size. The native vegetation is mainly scattered grasses and forbs. Elevation is 6,300 to 6,600 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 115 to 135 days.

Typically, the surface layer is brown and dark gray loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is light brownish gray gravelly sandy loam, the next part is very pale brown and light brownish gray loam, and the lower part is light brownish gray sandy loam. In some areas the soil is clay loam throughout.

Included in this unit are small areas of Aparejo, Sparank, and Venadito soils on flood plains. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Warm Springs soil. Available water capacity also is moderate. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. A seasonal high water table fluctuates between depths of 12 and 30 inches during the year. It reaches its highest level during the period April through July. This soil is slightly saline. The sodium absorption ratio is more than 13. The soil is frequently flooded for brief periods late in summer.

This unit generally is used for livestock grazing. In areas near San Rafael, it is used for urban development.

The potential natural plant community on this unit is mainly inland saltgrass, alkali sacaton, fourwing saltbush, and iodinebush. The average annual production of air-dry vegetation ranges from 2,000 pounds per acre in favorable years to 1,200 pounds in unfavorable years. If the plant community deteriorates, alkali sacaton and fourwing saltbush decrease in abundance and inland saltgrass and iodinebush increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is suited to such management practices as fencing and range seeding. Good grazing management can increase the productivity and reproduction potential of alkali sacaton. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. The main management concerns are the content of salts, depth to the water table, and the hazards of flooding and soil blowing.

If this unit is used for urban development, the main management concerns are the content of salts, depth to the water table, and the hazards of soil blowing and flooding. Plants that can tolerate the seasonal high water table, the salts, and droughtiness should be selected unless drainage and irrigation systems are installed. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

The selection of suitable trees and shrubs for windbreaks and environmental plantings is limited. The high water table, a high pH, and the content of salts affect the selection and growth of species. Seedling mortality may be severe because of the wetness. Cultivation or applications of herbicide can help to remove competing vegetation. Spring planting may be delayed because of the excessive moisture.

40—Aparejo clay loam, 0 to 1 percent slopes. This deep, well drained soil is on flood plains and alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 5 to 200 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,200 to 6,600 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface layer is reddish brown clay loam about 6 inches thick. The upper part of the underlying material is reddish brown and light reddish brown clay loam about 41 inches thick, and the lower part to a depth of 60 inches or more is light reddish brown clay loam. In some areas the soil is sandy below a depth of 40 inches.

Included in this unit are small areas of Glenberg and San Mateo soils on flood plains and alluvial fans and the saline Aparejo soils on flood plains. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Aparejo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. Thin strata of coarser textured material are throughout the profile. This soil is occasionally flooded for very brief periods in summer unless it is protected.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main hazards are flooding and soil blowing. Furrow, border, sprinkler, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted

crops. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main hazards are soil blowing and flooding. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of alkalinity and a high content of calcium carbonate, which ties up minerals and limits their availability. Cultivation or applications of herbicide can help to remove competing vegetation.

41—Aparejo clay loam, sandy substratum, 0 to 1 percent slopes. This deep, well drained soil is on alluvial fans and flood plains. It formed in mixed alluvium. Areas are irregular in shape and are 5 to 150 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,200 to 6,600 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface layer is reddish brown clay loam about 6 inches thick. The upper 18 inches of the underlying material is reddish brown clay loam, the next 8 inches is light reddish brown sandy clay loam, and the lower part to a depth of 60 inches is light yellowish brown fine sand that has some thin strata of clay loam. In some areas the lower part of the underlying material is not sandy.

Included in this unit are small areas of Venadito and Glenberg soils on alluvial fans and flood plains and the saline Aparejo soils on flood plains. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Aparejo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer unless it is protected.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main hazards are soil blowing and flooding. Furrow, border, sprinkler, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted crops. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main hazards are soil blowing and flooding. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of alkalinity and a high content of calcium carbonate, which ties up minerals and limits their availability. Cultivation or applications of herbicide can help to remove competing vegetation.

45—Aparejo clay, 0 to 1 percent slopes. This deep, well drained soil is on flood plains and alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 5 to 50 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,200 to 6,600 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface layer is reddish brown clay about 3 inches thick. The subsurface layer also is reddish brown clay. It is about 12 inches thick. The underlying material is yellowish brown. The upper 23 inches is sandy clay loam, and the lower part to a depth of 60 inches is dominantly sandy clay loam but includes some fine sandy loam. In some areas the surface layer is clay loam.

Included in this unit are small areas of Venadito and Glenberg soils on flood plains and alluvial fans and the saline Aparejo soils on flood plains. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Aparejo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer unless it is protected.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are the hazards of soil blowing and flooding and the clayey surface layer. Furrow, border, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted crops (fig. 5), but it generally is best suited to small grain and pasture. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main management concerns are the hazards of soil blowing and flooding, the clayey surface layer, and a high

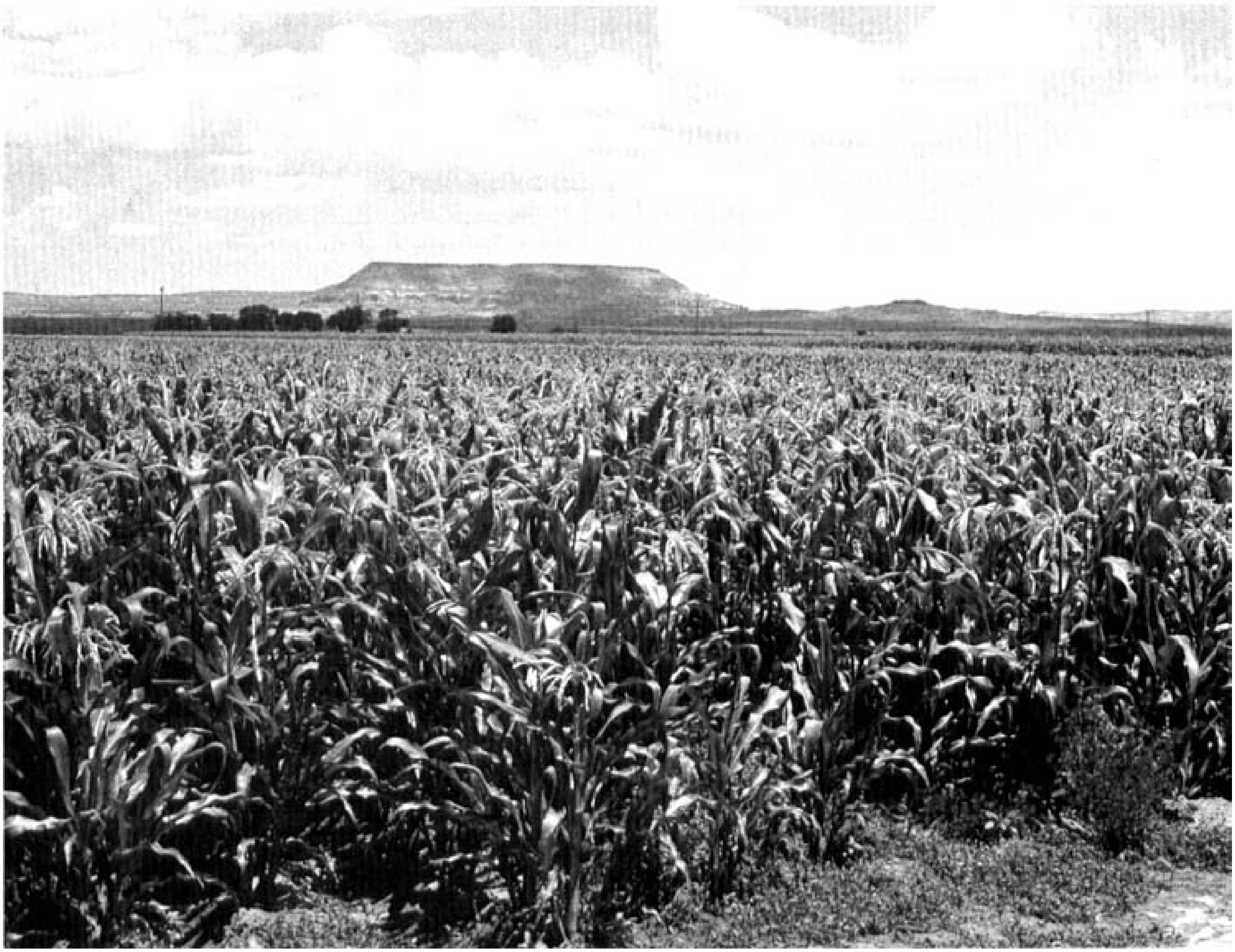


Figure 5.—Irrigated corn in an area of Aparejo clay, 0 to 1 percent slopes. Haystack Mountain, in the background, is the site of the first uranium mine in the Grants-Milan area.

shrink-swell potential. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks. Properly designing buildings and roads can reduce the damaging effects of the shrinking and swelling caused by the clayey texture.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of alkalinity and a high content of calcium carbonate, which ties up minerals and limits their availability. Cultivation or applications of herbicide can help to remove competing vegetation.

50—Venadito clay loam, 0 to 1 percent slopes. This deep, well drained soil is on alluvial fans and flood plains and in valleys. It formed in alluvium derived dominantly from shale. Areas are irregular in shape and are 5 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,200 to 6,800 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface layer is reddish brown clay loam about 3 inches thick. The upper part of the underlying material is reddish brown clay loam about 11 inches thick, and the lower part to a depth of 60 inches

is reddish brown and dark reddish brown clay. In some areas the surface layer is sandy clay loam.

Included in this unit are small areas of Aparejo soils on alluvial fans, in valleys, and on flood plains; Glenberg soils on flood plains; and the saline Venadito soils on flood plains. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Venadito soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil has a high shrink-swell potential. Unless protected, it is occasionally flooded for very brief periods in summer.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are the hazards of soil blowing and flooding, the clayey texture, and the high shrink-swell potential. Furrow, border, and corrugation irrigation systems are suitable. The unit generally is best suited to small grain and pasture. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main management concerns are the hazards of soil blowing and flooding, the clayey texture, and the high shrink-swell potential. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks. Properly designing buildings and roads can reduce the damaging effects of the shrinking and swelling caused by the clayey texture.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. The seedling mortality rate is high because of the high content of clay, which causes moisture stress in the seedlings. Extra care is needed during planting to ensure that the soil is firmly packed around the roots. Cultivation or applications of herbicide can help to remove competing vegetation.

51—Venadito sandy clay loam, 0 to 1 percent slopes. This deep, well drained soil is on alluvial fans, in valleys, and on flood plains. It formed in alluvium derived dominantly from shale. Areas are irregular in shape and are 5 to 80 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,200 to 6,800 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface layer is pale brown sandy clay loam about 6 inches thick. The upper part of the underlying material is pale brown clay loam about 13 inches thick, and the lower part to a depth of 60 inches is reddish brown clay. In some areas the surface layer is clay loam.

Included in this unit are small areas of Aparejo soils on flood plains, in valleys, and on alluvial fans and Glenberg soils on flood plains. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Venadito soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer unless it is protected.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are the hazards of flooding and soil blowing, the clayey texture, and a high shrink-swell potential. Furrow, border, sprinkler, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted crops, but it generally is best suited to small grain and pasture. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main management concerns are the hazards of flooding and soil blowing, the clayey texture, and a high shrink-swell potential. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks. Properly designing buildings and roads can reduce the damaging effects of the shrinking and swelling caused by the clayey texture.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. The seedling mortality rate is high because of the high content of clay, which causes moisture stress in the seedlings. Extra care is needed during planting to ensure that the soil is firmly packed around the roots. Cultivation or applications of herbicide can help to remove competing vegetation.

52—Venadito Variant clay loam, 0 to 1 percent slopes. This moderately deep, well drained soil is in valleys and on flood plains and alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 5 to 50 acres in size. The native vegetation is mainly

grasses and forbs. Elevation is 6,200 to 6,600 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface layer is reddish brown clay loam about 3 inches thick. The upper part of the underlying material is reddish brown clay about 15 inches thick, and the lower part is dark brown clay about 17 inches thick. Basalt is at a depth of about 35 inches.

Included in this unit are small areas of soils that are similar to the Venadito Variant soil but have bedrock within a depth of 20 inches, soils that are similar to Aparejo soils but are moderately deep, and Aparejo soils on flood plains and alluvial fans and in valleys. Included areas make up about 20 percent of the total acreage.

Permeability is very slow in the Venadito Variant soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil has a high shrink-swell potential. Unless protected, it is occasionally flooded for very brief periods in summer.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are the hazards of flooding and soil blowing, the clayey texture, the high shrink-swell potential, and the depth to bedrock. Furrow, border, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted crops, but it is best suited to small grain and pasture. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main management concerns are the hazards of flooding and soil blowing, the clayey texture, the high shrink-swell potential, and the depth to bedrock. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks. Properly designing buildings and roads can reduce the damaging effects of the shrinking and swelling caused by the clayey texture.

55—Glenberg-San Mateo complex, 0 to 2 percent slopes. This map unit is on alluvial fans and flood plains. Areas are irregular in shape and are 3 to 200 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,200 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

This unit is 45 percent Glenberg sandy loam, 0 to 2 percent slopes, and 35 percent San Mateo sandy clay loam, 0 to 2 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Aparejo soils on alluvial fans and flood plains, Venadito soils on flood plains, and Mespun soils on small dunes. Also included, on alluvial fans, are soils that are similar to the Glenberg and San Mateo soils but are saline. Included areas make up about 20 percent of the total acreage.

The Glenberg soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light yellowish brown sandy loam about 11 inches thick. The upper part of the underlying material is light yellowish brown sandy loam about 10 inches thick, and the lower part to a depth of 60 inches is dominantly sandy loam but has strata of loam to loamy sand. In some areas clay is at a depth of about 48 to 60 inches.

Permeability is moderately rapid in the Glenberg soil. Available water capacity is moderate. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer.

The San Mateo soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown sandy clay loam about 4 inches thick. The upper 12 inches of the underlying material is brown sandy clay loam. The next 17 inches is pale brown silty clay loam. The lower part to a depth of 60 inches is dominantly pale brown silty clay loam, but it has strata ranging from loam to silty clay loam.

Permeability is moderate in the San Mateo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer.

Most areas of this unit are used for irrigated crops. A few areas are used for urban development.

If this unit is used for irrigated crops, the main management concerns are the hazards of soil blowing and flooding. Furrow, border, sprinkler, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted crops. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main management concerns are the hazards of flooding and

soil blowing and the sandy texture. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of alkalinity and a high content of calcium carbonate, which ties up minerals and limits their availability. Cultivation or applications of herbicide can help to remove competing vegetation.

56—Mespun loamy sand, 1 to 5 percent slopes. This deep, excessively drained soil is on dunes. It formed in eolian material derived dominantly from sandstone. Areas are irregular in shape and are 15 to 150 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,500 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 135 days.

Typically, the surface layer is yellowish brown loamy sand about 2 inches thick. The underlying material to a depth of 60 inches is strong brown loamy fine sand and fine sand. In some areas the soil has thin strata of sandy loam at a depth of more than 40 inches.

Included in this unit are small areas of Palma soils between dunes, Aparejo and Glenberg soils in swales, and Penistaja soils on fan terraces. Included areas make up about 20 percent of the total acreage.

Permeability is rapid in the Mespun soil. Available water capacity is low. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for urban development. It is suited to urban uses. The main management concerns are the sandy texture and the hazard of soil blowing. Excavation for houses and access roads can expose material that is highly susceptible to soil blowing. Properly designed and managed windbreaks can reduce the risk of soil blowing. Cutbanks are not stable and therefore are subject to slumping. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. The seedling mortality rate is moderate because of the low available water capacity, which causes moisture stress in the seedlings. Soil blowing is the main hazard on this unit. Unless the young seedlings are protected during high winds, they can be damaged by sand blasting or covered by drifting sand. Soil blowing can be controlled by maintaining strips of native vegetation between the rows of trees and shrubs. Undesirable grasses and weeds can be controlled by applying herbicides or by rototilling or hoeing.

57—San Mateo clay loam, 1 to 3 percent slopes. This deep, well drained soil is on flood plains and alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 5 to 100 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 5,800 to 6,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface layer is light brownish gray clay loam about 6 inches thick. The upper part of the underlying material is light brownish gray clay loam about 16 inches thick, and the lower part to a depth of 60 inches is brown sandy clay loam. In some areas the surface layer is sandy clay loam, and in other areas the slope is less than 1 percent.

Included in this unit are small areas of Sparank soils on flood plains, Glenberg soils on flood plains and alluvial fans, and the saline San Mateo soils on alluvial fans. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the San Mateo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main hazards are soil blowing and flooding. Furrow, border, sprinkler, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted crops. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main hazards are flooding and soil blowing. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of alkalinity and a high content of calcium

carbonate, which ties up minerals and limits their availability. Cultivation or applications of herbicide can help to remove competing vegetation.

58—San Mateo sandy clay loam, 1 to 3 percent slopes. This deep, well drained soil is on flood plains and alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 5 to 150 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 5,800 to 6,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 110 to 140 days.

Typically, the surface layer is light olive brown sandy clay loam about 4 inches thick. The upper part of the underlying material is light yellowish brown sandy clay loam about 43 inches thick, and the lower part to a depth of 60 inches is light yellowish brown clay loam. In some areas the surface layer is clay loam, and in other areas the slope is less than 1 percent.

Included in this unit are small areas of Sparank soils on flood plains. Also included, on alluvial fans, are small areas of the saline San Mateo soils and small areas of Glenberg soils. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the San Mateo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate. This soil is occasionally flooded for very brief periods in summer.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main hazards are soil blowing and flooding. Furrow, border, sprinkler, and corrugation irrigation systems are suitable. The unit is suited to all climatically adapted crops. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main hazards are flooding and soil blowing. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of alkalinity and a high content of calcium carbonate, which ties up minerals and limits their availability. Cultivation or applications of herbicide can help to remove competing vegetation.

60—Sparank clay loam, 1 to 3 percent slopes. This deep, well drained soil is on flood plains and alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 5,800 to 6,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 120 to 150 days.

Typically, the surface layer is light brownish gray clay loam about 10 inches thick. The upper part of the underlying material is light brownish gray silty clay about 22 inches thick, and the lower part to a depth of 60 inches is pale brown silty clay. In some areas the surface layer is sandy clay.

Included in this unit are small areas of San Mateo soils on flood plains and alluvial fans and the saline, wet, and sodic Sparank and San Mateo soils on flood plains. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Sparank soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. This soil is occasionally flooded for brief periods in summer.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are the clayey texture and the hazards of flooding and soil blowing. Furrow, border, sprinkler, and corrugation irrigation systems are suitable. Generally, the unit is best suited to small grain and pasture. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main management concerns are the hazards of flooding and soil blowing, the clayey texture, and a high shrink-swell potential. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks. Properly designing buildings and roads can reduce the damaging effects of the shrinking and swelling caused by the clayey texture.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. The seedling mortality rate is high because of the high content of clay, which causes moisture stress in the seedlings. Extra care is needed during planting to ensure that the soil is firmly packed

around the roots. Cultivation or applications of herbicide can help to remove competing vegetation.

61—Sparham clay loam, 0 to 2 percent slopes. This deep, somewhat poorly drained soil is on flood plains. It formed in mixed alluvium. Areas are irregular in shape and are 10 to 90 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,200 to 6,600 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 120 to 140 days.

Typically, the surface layer is grayish brown clay loam about 10 inches thick. The upper part of the underlying material is pale brown silty clay about 34 inches thick, and the lower part to a depth of 60 inches is light olive brown clay.

Included in this unit are small areas of San Mateo and Sparank soils on flood plains and soils that are similar to the Sparham soil but have a water table at a depth of less than 36 inches. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Sparham soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. A seasonal high water table fluctuates between depths of 36 and 48 inches during the period April through September. The soil is moderately saline. It is occasionally flooded for brief periods in summer.

This unit is used for irrigated pasture and urban development.

If this unit is used for irrigated pasture, the main management concerns are the clayey texture, the fluctuating water table, and the hazards of flooding and soil blowing. Furrow, border, sprinkler, and corrugation irrigation systems are suitable.

If this unit is used for irrigated crops, salinity limits the choice of crops. The unit generally is suited to small grain. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

If this unit is used for urban development, the main management concerns are the clayey texture, the fluctuating water table, a high shrink-swell potential, a high content of salts, and the hazards of flooding and soil blowing. In summer, irrigation is needed in areas used for lawn grasses. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks. Properly designing buildings and roads can reduce the damaging effects of wetness and of the shrinking and swelling caused by the clayey texture.

This unit generally is unsuitable for windbreaks and environmental plantings. In some areas trees and shrubs can be grown if special treatment is applied.

62—Sparank sandy clay loam, saline, sodic, 1 to 3 percent slopes. This deep, well drained soil is on flood plains and alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly grasses. Elevation is 6,200 to 6,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 120 to 150 days.

Typically, the surface layer is light brownish gray sandy clay loam about 5 inches thick. The underlying material to a depth of 60 inches is light yellowish brown and grayish brown clay. In some areas the surface layer is clay loam or silty clay.

Included in this unit are small areas of San Mateo soils on flood plains and fans and Mikim soils on fans. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Sparank soil. Available water capacity is very low. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is severe. The hazard of soil blowing is moderate. The soil is strongly saline. The sodium absorption ratio is more than 13. The soil commonly is eroded and gullied. Where it is not gullied, it is occasionally flooded for brief periods in summer.

This unit is used for livestock grazing. The potential natural plant community is mainly alkali sacaton, fourwing saltbush, blue grama, black greasewood, inland saltgrass, and western wheatgrass. The average annual production of air-dry vegetation ranges from 1,500 pounds per acre in favorable years to 550 pounds in unfavorable years. If the plant community deteriorates, alkali sacaton, western wheatgrass, and blue grama decrease in abundance and black greasewood and inland saltgrass increase. The increasers generally occur in small amounts in the potential natural plant community. The unit is suitable as a site for livestock ponds. Good grazing management can increase the productivity and reproduction potential of alkali sacaton.

This unit generally is unsuitable for windbreaks and environmental plantings. In some areas trees and shrubs can be grown if special treatment is applied.

66—Zia fine sandy loam, 3 to 5 percent slopes. This deep, well drained soil is fan terraces and valley sides. It formed in wind-modified alluvium derived dominantly from sandstone. Areas are irregular in shape and are 10 to 50 acres in size. The native vegetation is mainly grasses. Elevation is 6,000 to

6,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 120 to 140 days.

Typically, the surface layer is dark yellowish brown fine sandy loam about 8 inches thick. The upper part of the underlying material is brown fine sandy loam about 39 inches thick, and the lower part to a depth of 60 inches is yellow fine sandy loam.

Included in this unit are small areas of San Mateo soils on flood plains and alluvial fans; Mikim soils on fan terraces; Sparank soils on flood plains, in valleys, and on alluvial fans; and Penistaja soils on fan terraces. Included areas make up about 15 percent of the total acreage.

Permeability is moderately rapid in the Zia soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for urban development and irrigated crops.

If this unit is used for irrigated crops, the main hazard is soil blowing. Furrow and sprinkler irrigation systems are suitable. The unit is suited to all climatically adapted crops. Stubble and other crop residue can provide protection against soil blowing in spring.

This unit is suited to urban development. The main management concerns are the hazard of soil blowing and the sandy texture. Excavation for houses and access roads can expose material that is highly susceptible to soil blowing. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Properly designed and managed windbreaks can reduce the risk of soil blowing.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. Soil blowing is the main hazard. During periods of high winds, young seedlings can damaged by sand blasting and covered with drifting sand unless they are protected. Soil blowing can be controlled by maintaining strips of native vegetation between the plantings. Undesirable grasses and weeds can be controlled by applying herbicides or by rototilling or hoeing.

70—Catman clay loam, 1 to 3 percent slopes. This deep, well drained soil is on alluvial fans and flood plains and in valleys. It formed in mixed alluvium. Areas are irregular in shape and are 25 to 200 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,800 to 7,000 feet. The average annual precipitation is about 13 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is dark brown clay loam about 6 inches thick. The upper part of the underlying material is dark brown clay about 35 inches thick, and the lower part to a depth of 60 inches is dark yellowish brown clay. In some areas the surface layer is sandy clay loam.

Included in this unit are small areas of Hickman soils on alluvial fans and flood plains, Catman Variant soils on valley bottoms and flood plains, and the saline Catman soils on alluvial fans and valley sides. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Catman soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight. The soil has very pronounced vertical cracks as a result of shrinking and swelling. It is slightly saline. It is occasionally flooded for long periods in summer unless it is protected.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are the clayey texture, a high shrink-swell potential, and the hazard of flooding. Graded or level border irrigation systems are suitable. The unit generally is best suited to small grain and pasture. Major flood-control structures are needed.

If this unit is used for urban development, the main management concerns are a high shrink-swell potential, the clayey texture, and the hazard of flooding. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Properly designing buildings and roads can reduce the damaging effects of the shrinking and swelling caused by the clayey texture.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. The seedling mortality rate is high because of the content of clay, which causes moisture stress in the seedlings. Extra care is needed during planting to ensure that the soil is firmly packed around the roots. Cultivation or applications of herbicide can help to remove competing vegetation. Drip irrigation can help to establish windbreaks.

72—Catman Variant clay loam, 1 to 3 percent slopes. This deep, somewhat poorly drained soil is on alluvial fans and flood plains and in valleys. It formed in mixed alluvium. Areas are irregular in shape and are 25 to 200 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,800 to 6,900 feet. The

average annual precipitation is about 13 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is dark brown clay loam about 10 inches thick. The upper part of the underlying material is brown clay about 23 inches thick, and the lower part to a depth of 60 inches is yellowish brown clay.

Included in this unit are small areas of Catman soils on alluvial fans, in valleys, and on flood plains and Hickman soils on alluvial fans and flood plains. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Catman Variant soil. Available water capacity is moderate. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight. A seasonal high water table generally fluctuates between depths of 24 and 40 inches. It occasionally rises to as high as 15 inches sometime during the period April through September. The soil is occasionally flooded for brief periods in summer. It is moderately saline.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are the hazard of flooding, a high shrink-swell potential, a high content of salts, and the fluctuating water table. Graded or level border irrigation systems are suitable. Salinity, the fluctuating water table, and the clayey texture limit the choice of crops. The unit generally is best suited to small grain and pasture. Major flood-control structures are needed.

If this unit is used for urban development, the main management concerns are the hazard of flooding, a high shrink-swell potential, the fluctuating water table, a high content of salts, and the clayey texture. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Properly designing buildings and roads can reduce the damaging effects of wetness, salinity, and shrinking and swelling.

This unit generally is unsuitable as a site for windbreaks and environmental plantings. In some areas trees and shrubs can be grown if special treatment is applied.

73—Catman sandy clay loam, 1 to 3 percent slopes. This deep, well drained soil is on alluvial fans, in valleys, and on flood plains. It formed in mixed alluvium. Areas are irregular in shape and are 20 to 100 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,800 to 7,000 feet. The average annual precipitation is about 13 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is light olive brown sandy clay loam about 6 inches thick. The upper part of the underlying material is light olive brown sandy clay loam about 4 inches thick, and the lower part to a depth of 60 inches is light olive brown clay. In some areas the surface layer is clay loam.

Included in this unit are small areas of Hickman soils on flood plains and alluvial fans and the saline Catman soils on alluvial fans and valley sides. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Catman soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight. The soil is slightly saline. It is occasionally flooded for long periods in summer unless it is protected.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main management concerns are the hazard of flooding, a high shrink-swell potential, and the clayey texture. Graded border and sprinkler irrigation systems are suitable. The unit is suited to all climatically adapted crops, but it generally is best suited to small grain and pasture. Major flood-control structures are needed. Stubble and other crop residue can improve tilth.

If this unit is used for urban development, the main management concerns are a high shrink-swell potential, the clayey texture, and the hazard of flooding. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Properly designing buildings and roads can reduce the damaging effects of the shrinking and swelling caused by the clayey texture.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. The seedling mortality rate is high because of the high content of clay, which causes moisture stress in the seedlings. Extra care is needed during planting to ensure that the soil is firmly packed around the roots. Cultivation or applications of herbicide can help to remove competing vegetation. Drip irrigation can help to establish windbreaks.

75—Hickman sandy clay loam, 1 to 3 percent slopes. This deep, well drained soil is on flood plains and alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 5 to 150 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,800 to 7,000 feet. The average annual precipitation

is about 13 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is light olive brown sandy clay loam about 6 inches thick. The underlying material to a depth of 60 inches is stratified, light olive brown and light yellowish brown sandy clay loam, clay loam, sandy loam, and silty clay loam. In some areas the surface layer is clay loam.

Included in this unit are small areas of Catman and Catman Variant soils. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Hickman soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight. The soil is occasionally flooded for very brief periods in summer.

This unit is used for irrigated crops and urban development.

If this unit is used for irrigated crops, the main hazard is flooding. Graded border and sprinkler irrigation systems are suitable. The unit is suited to all climatically adapted crops, but it generally is best suited to small grain and pasture. Major flood-control structures are needed.

If this unit is used for urban development, the main hazard is flooding. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of alkalinity and a high content of calcium carbonate, which ties up minerals and limits their availability. Cultivation or applications of herbicide can help to remove competing vegetation.

100—Manzano loam, 1 to 5 percent slopes. This deep, well drained soil is on alluvial fans. It formed in mixed alluvium. Areas are irregular in shape and are 10 to 100 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,500 to 7,300 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 115 to 135 days.

Typically, the surface layer is brown loam about 4 inches thick. The upper part of the subsoil is brown silt loam about 18 inches thick, and the lower part to a depth of 60 inches is brown and dark yellowish brown loam and clay loam.

Included in this unit are small areas of Aparejo and Venadito soils along drainageways, Millpaw soils in swales, and Teco, Flugle, and Goesling soils on fan terraces. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Manzano soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe. The soil is occasionally flooded for very brief periods late in spring and in summer.

This unit is used for livestock grazing and urban development.

The potential natural plant community on this unit is mainly blue grama, western wheatgrass, New Mexico feathergrass, and spike muhly. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and spike muhly decrease in abundance and blue grama increases. The increasers generally occur in small amounts in the potential natural plant community.

This unit is suited to such management practices as livestock pipelines, range seeding, and brush control. Good grazing management can increase the productivity and reproduction potential of western wheatgrass and New Mexico feathergrass.

If this unit is used for urban development, the main hazards are soil blowing and flooding. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Major flood-control structures are needed. Soil blowing can be controlled by maintaining a good plant cover and establishing windbreaks.

A wide variety of trees and shrubs can be grown as windbreaks and environmental plantings on this unit. Cultivation or applications of herbicide can help to remove competing vegetation.

120—Rock outcrop-Laporte complex, 30 to 60 percent slopes. This map unit is on hills, ridges, and ledges. Areas are irregular in shape and are 100 to 1,500 acres in size. The native vegetation is mainly trees, shrubs, and grasses. Elevation is 6,650 to 7,500 feet. The average annual precipitation is about 12 to 15 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 110 to 135 days.

This unit is 50 percent Rock outcrop and 35 percent Laporte very cobbly loam, 30 to 60 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of soils that are similar to the Laporte soil but are very cobbly in the subsoil or are moderately deep and small areas of

Atarque, Mion, and Celacy soils on hills. Included areas make up about 15 percent of the total acreage.

The Rock outcrop consists of barren or nearly barren areas of limestone on the upper part of hills and ridges.

The Laporte soil is shallow and well drained. It formed in mixed colluvium and windblown sediments over limestone. Typically, the surface layer is dark yellowish brown very cobbly loam about 2 inches thick. The underlying material is yellowish brown cobbly loam about 9 inches thick. Limestone is at a depth of about 11 inches. In some areas the slope is less than 30 percent.

Permeability is moderate in the Laporte soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

This unit is used for livestock grazing and fuel wood production.

The site index for trees on the Laporte soil ranges from 32 to 42. Based on a site index of 36, the soil can produce 4 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The understory vegetation is blue grama, pine dropseed, and four o'clock.

Good management is needed to protect the Laporte soil against excessive water erosion. The soil is not suitable as a site for livestock pipelines and ponds because of the depth to bedrock and the slope.

130—Laporte-Rock outcrop complex, 3 to 20 percent slopes. This map unit is on ridges and hills. Areas are irregular in shape and are 100 to 2,000 acres in size. The native vegetation is mainly pinyon, juniper, and shrubs. Elevation is 6,800 to 7,500 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 110 to 135 days.

This unit is 55 percent Laporte gravelly loam, 3 to 20 percent slopes, and 30 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of soils that are similar to the Laporte soil but are very cobbly in the subsoil or are moderately deep over limestone, Celacy and Flugle soils on hills, and Winona and Mion soils. Included areas make up about 15 percent of the total acreage.

The Laporte soil is shallow and well drained. It formed in mixed colluvium and windblown sediments over limestone. Typically, the surface layer is dark brown gravelly loam about 3 inches thick. The underlying material is dark grayish brown gravelly loam about 8 inches thick. Limestone is at a depth of about 11 inches.

Permeability is moderate in the Laporte soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Rock outcrop consists of barren or nearly barren areas of exposed limestone on hills and ridges.

This unit is used for livestock grazing and fuel wood production.

The site index for trees on the Laporte soil ranges from 35 to 45. Based on a site index of 40, the soil can produce 5 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The understory vegetation is blue grama, pine dropseed, and four o'clock. As the density of the canopy increases, the abundance of the understory decreases.

Good management is needed to protect the Laporte soil against excessive water erosion. The soil is not suitable as a site for livestock pipelines and ponds because of the depth to bedrock.

200—Penistaja fine sandy loam, 2 to 10 percent slopes. This deep, well drained soil is on the dip slopes of cuestas and on fan terraces and valley sides. It formed in wind-modified alluvium derived dominantly from sandstone. Areas are irregular in shape and are 60 to 1,200 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 6,000 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 115 to 140 days.

Typically, the surface layer is brown fine sandy loam about 2 inches thick. The upper part of the subsoil is brown and strong brown sandy clay loam about 20 inches thick. The lower part of the subsoil and the substratum to a depth of 60 inches are light brown and reddish yellow sandy loam. In some areas near the boundary of Catron County, the subsoil has a higher content of clay. In some areas near the boundary of Socorro County, the soil has a higher content of calcium carbonate and coarse fragments. In some areas near the boundary of Bernalillo County, it is shallow over sandstone.

Included in this unit are small areas of Hagerman and Bond soils on the upper dip slopes of cuestas and on ridgetops, Poley soils on benches, Palma and Mespun soils on hillsides, and Mikim soils on fan terraces. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Penistaja soil.

Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing. The potential natural plant community is mainly blue grama, western wheatgrass, fourwing saltbush, and winterfat. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and Indian ricegrass decrease in abundance and blue grama, ring muhly, and broom snakeweed increase. The increasers generally occur in small amounts in the potential natural plant community. Pinyon and oneseed juniper may invade.

Good grazing management can increase the productivity and reproduction potential of western wheatgrass, spike muhly, and sideoats grama. Properly managing livestock grazing and maintaining enough plant residue on the surface can help to protect the soil against soil blowing.

This unit is suited to such management practices as livestock pipelines, fencing, and range seeding. It is not suitable as a site for livestock ponds because of seepage.

205—Ildefonso very gravelly sandy loam, 3 to 15 percent slopes. This deep, well drained soil is on ridges and fan terraces. It formed in mixed alluvium. Areas are elongated and are 20 to 100 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,900 to 6,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 150 days.

Typically, the surface layer is brown very gravelly sandy loam about 3 inches thick. The upper part of the subsoil is light brown very gravelly loam about 5 inches thick, and the lower part to a depth of 60 inches is light brown and pink very gravelly loam. A strongly calcareous layer is at a depth of 20 inches or less.

Included in this unit are small areas of Harvey soils on ridges, Penistaja soils on fan terraces, and Manzano soils on fans. Included areas make up about 20 percent of the total acreage.

Permeability is moderate in the Ildefonso soil. Available water capacity also is moderate. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used for livestock grazing. The potential natural plant community is mainly blue grama, little bluestem, black grama, and winterfat. The average annual production of air-dry vegetation ranges from 900 pounds per acre in favorable years to 350 pounds in unfavorable years. If the plant community deteriorates, black grama and winterfat decrease in abundance and blue grama and threeawn increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is limited as a site for livestock ponds because of seepage. Good grazing management can increase the productivity and reproduction potential of winterfat and black grama.

210—Bond-Penistaja-Rock outcrop complex, 2 to 15 percent slopes. This map unit is on valley sides, hills, ridges, and cuestas. Areas are irregular in shape and are 50 to 450 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 6,000 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 115 to 140 days.

This unit is about 45 percent Bond sandy loam, 2 to 15 percent slopes; 25 percent Penistaja sandy loam, 2 to 10 percent slopes; and 20 percent Rock outcrop. The Bond soil is on hills and ridgetops and on cuestas near areas of Rock outcrop. The Penistaja soil is on valley sides, ridges, and cuestas. The Rock outcrop is on escarpments and hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Poley soils on benches, Skyvillage soils on hills and ridgetops, Mikim and Mion soils on fan terraces, and Hagerman soils on hills. Included areas make up about 10 percent of the total acreage.

The Bond soil is shallow and well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is brown sandy loam about 3 inches thick. The next layer is brown sandy loam about 4 inches thick. The subsoil is reddish brown sandy clay loam about 6 inches thick. The substratum is light brown sandy clay loam about 3 inches thick. Sandstone is at a depth of about 16 inches.

Permeability is moderate in the Bond soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Penistaja soil formed in wind-modified alluvium derived dominantly from sandstone. Typically, the surface layer is reddish brown sandy loam about 3 inches thick. The upper part of the subsoil is reddish brown sandy clay loam about 27 inches thick. The lower part of the subsoil and the substratum to a depth of 60

inches are light reddish brown and reddish brown sandy loam.

Permeability is moderate in the Penistaja soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Rock outcrop consists of barren or nearly barren areas of exposed sandstone on hills, ridges, and escarpments.

This unit is used for livestock grazing. The potential natural plant community on the Bond soil is mainly sideoats grama, New Mexico feathergrass, Indian ricegrass, blue grama, and scattered oneseed juniper. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 275 pounds in unfavorable years. If the plant community deteriorates, sideoats grama, New Mexico feathergrass, and Indian ricegrass decrease in abundance and blue grama, broom snakeweed, and oneseed juniper increase. The increasers generally occur in small amounts in the potential natural plant community.

The suitability of the Bond soil for such management practices as livestock pipelines, range seeding, and fencing is limited because of the depth to bedrock and the available water capacity. The soil is suited to such practices as deferred grazing and rotation grazing. Good grazing management can increase the productivity and reproduction potential of sideoats grama and New Mexico feathergrass.

The potential natural plant community on the Penistaja soil is mainly blue grama, western wheatgrass, fourwing saltbush, and winterfat. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and Indian ricegrass decrease in abundance and blue grama, ring muhly, sand dropseed, pinyon, and oneseed juniper increase. The increasers generally occur in small amounts in the potential natural plant community.

The Penistaja soil is suited to such management practices as livestock pipelines, fencing, and range seeding. It is not suitable as a site for livestock ponds because of seepage. Good grazing management can increase the productivity and reproduction potential of western wheatgrass and Indian ricegrass.

Properly managing livestock grazing and maintaining enough plant residue on the surface can help to protect the soils against soil blowing.

218—Viuda-Penistaja-Rock outcrop complex, 1 to 10 percent slopes. This map unit is on hills and ridges and in valleys between lava ridges. Areas are irregular in shape and are 2,000 to 5,000 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 49 to 52 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 40 percent Viuda very cobbly sandy loam, 2 to 10 percent slopes, very stony; 35 percent Penistaja sandy loam, 1 to 5 percent slopes; and 15 percent Rock outcrop. The Viuda soil and Rock outcrop are on hills and ridges, and the Penistaja soil is in valleys between lava ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Sparank and San Mateo soils on the bottom of valleys between lava ridges; deep, fine textured soils in valleys between lava ridges; and Hagerman and Bond soils on ridges. Included areas make up about 10 percent of the total acreage.

The Viuda soil is shallow and well drained. It formed in alluvium and windblown sediments over basalt. Typically, the surface layer is brown very cobbly sandy loam about 3 inches thick. The upper part of the subsoil is brown clay about 13 inches thick, and the lower part is light brown cobbly clay loam about 3 inches thick. Basalt is at a depth of about 19 inches.

Permeability is slow in the Viuda soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Penistaja soil is deep and well drained. It formed in wind-modified, mixed alluvium. Typically, the surface layer is brown sandy loam about 2 inches thick. The upper part of the subsoil is dark yellowish brown sandy clay loam about 22 inches thick. The lower part of the subsoil and the substratum to a depth of 60 inches are yellowish brown sandy loam.

Permeability is moderate in the Penistaja soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Rock outcrop consists of barren or nearly barren areas of exposed volcanic rock on ridges and hills.

This unit generally is used for livestock grazing. In areas near Grants, it is used for urban development.

The potential natural plant community on the Viuda soil is mainly blue grama, sideoats grama, black grama, little bluestem, and wolftail. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 425 pounds in unfavorable years. If the plant community deteriorates,

sideoats grama, black grama, and little bluestem decrease in abundance and blue grama increases. Blue grama generally occurs in small amounts in the potential natural plant community.

The suitability of the Viuda soil for such management practices as livestock pipelines is limited because of the rock fragments and the depth to bedrock.

The potential natural plant community on the Penistaja soil is mainly blue grama, western wheatgrass, fourwing saltbush, and winterfat. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and Indian ricegrass decrease in abundance and blue grama, ring muhly, sand dropseed, pinyon, and oneseed juniper increase. The increasers generally occur in small amounts in the potential natural plant community.

The Penistaja soil is suited to such management practices as livestock pipelines, fencing, and range seeding. It is not suitable as a site for livestock ponds because of seepage. Good grazing management can increase the productivity and reproduction potential of western wheatgrass.

Properly managing livestock grazing and maintaining enough plant residue on the surface can help to protect the soils in this unit against soil blowing.

The Viuda soil is poorly suited to urban development. The main management concerns are the depth to bedrock, the stones on the surface, and the hazard of soil blowing. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees.

The Penistaja soil is well suited to urban development. The main hazard is soil blowing. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Properly designed and managed windbreaks can reduce the risk of soil blowing.

The Viuda soil generally is unsuitable for windbreaks and environmental plantings. In some areas trees and shrubs can be grown if special treatment is applied.

A wide variety of trees and shrubs can be grown as windbreaks and environmental plantings on the Penistaja soil. Cultivation or applications of herbicide can help to remove competing vegetation.

230—Dumps-Pits complex. This map unit is on hills and flats. Slope is 5 to 90 percent. Areas are irregular in shape and are 200 to 1,000 acres in size. The unit is essentially barren of vegetation. Elevation is 6,000 to 7,500 feet. The average annual precipitation is about 8 to 15 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 100 to 160 days.

This unit is 50 percent Dumps and 35 percent Pits.

Included in this unit are small areas of Atarque, Bond, Hagerman, Penistaja, and Poley soils on mesas, hills, and flats; Mikim soils on fans; and San Mateo and Sparank soils in valleys. Included areas make up about 15 percent of the total acreage.

Dumps occur as areas of waste rock, mine spoil (mainly uranium tailings), and other refuse. Reaction ranges from medium acid to very strongly alkaline.

Pits consist of open excavations from which soil material and some rocks have been removed.

This unit has very limited value as a site for agricultural uses. The main limitations are a shallow depth, poor tilth, low fertility, and extremes in reaction. The unit has some value as a source of construction material.

251—Skyvillage-Rock outcrop-Bond complex, 3 to 40 percent slopes. This map unit is on benches, escarpments, and mesas. Areas are irregular in shape and are 100 to 600 acres in size. The native vegetation is mainly grasses, shrubs, and scattered pinyon and oneseed juniper. Elevation is 6,000 to 6,800 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 150 days.

This unit is 40 percent Skyvillage sandy loam, 3 to 40 percent slopes; 30 percent Rock outcrop; and 20 percent Bond sandy loam, 3 to 8 percent slopes. The Skyvillage soil is on benches, the lee side of mesas, and the edges of mesa tops; the Rock outcrop is on escarpments; and the Bond soil is on benches and the edges of mesas. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of San Mateo and Sparank soils in valleys, Mikim and Mion soils on toe slopes, and Hagerman and Penistaja soils on mesas. Included areas make up about 10 percent of the total acreage.

The Skyvillage soil is shallow and well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is light yellowish brown sandy loam about 4 inches thick. The underlying material is dark yellowish brown sandy loam about 8 inches thick. Sandstone is at a depth of about 12 inches.

Permeability is moderately rapid in the Skyvillage soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and

the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Rock outcrop consists of barren or nearly barren areas of exposed sandstone on benches and escarpments.

The Bond soil is shallow and well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is brown sandy loam about 4 inches thick. The subsoil is reddish brown sandy clay loam about 6 inches thick. Sandstone is at a depth of about 10 inches.

Permeability is moderate in the Bond soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing. The potential natural plant community is mainly Indian ricegrass, New Mexico feathergrass, blue grama, Mormon tea, and scattered pinyon and oneseed juniper. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 275 pounds in unfavorable years. If the plant community deteriorates, New Mexico feathergrass and Indian ricegrass decrease in abundance and blue grama, threeawn, sandhill muhly, shrubs, and trees increase. The increasers generally occur in small amounts in the potential natural plant community.

In some areas dense stands of pinyon and oneseed juniper may become established. If properly managed, a limited wood crop can be produced in these areas.

This unit is suited to such management practices as deferred grazing and rotation grazing. Because of droughtiness, the shallow depth, and the slope, the unit is not suitable for such management practices as livestock pipelines, livestock ponds, and range seeding.

257—Sparank-San Mateo complex, 0 to 5 percent slopes. This map unit is on flood plains, in broad drainageways, in valleys, and on alluvial fans. Areas are elongated and are 100 to 1,500 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,800 to 6,600 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 145 days.

This unit is 50 percent Sparank clay loam, 0 to 3 percent slopes, and 40 percent San Mateo loam, 1 to 5 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. The soils in some areas near the boundary of Catron County are more moist in the underlying material, and those in some areas near the boundary of Bernalillo County are more highly developed.

Included in this unit are small areas of Aparejo, Glenberg, and Venadito soils on flood plains, in valleys, and on alluvial fans and Penistaja soils on fan terraces. Included areas make up about 10 percent of the total acreage.

The Sparank soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light yellowish brown clay loam about 2 inches thick. The underlying material to a depth of 60 inches is light yellowish brown and light olive brown silty clay.

Permeability is very slow in the Sparank soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is moderate. The hazard of soil blowing is severe. This soil is occasionally flooded for brief periods in summer unless it is protected or gullied.

The San Mateo soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is light yellowish brown loam about 2 inches thick. The upper 27 inches of the underlying material is light olive brown loam and sandy clay loam, and the lower part to a depth of 60 inches is dominantly light olive brown sandy clay loam but has thin strata of sandy loam to silty clay loam.

Permeability is moderate in the San Mateo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer unless it is protected or gullied.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is mainly western wheatgrass, vine mesquite, alkali sacaton, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 3,200 pounds per acre in favorable years to 1,250 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, vine mesquite, alkali sacaton, and winterfat decrease in abundance and blue grama, galleta, broom snakeweed, and rabbitbrush increase. The increasers generally occur in small amounts in the potential natural plant community.

Deterioration of the plant community on this unit often results in the formation of gullies that drain the site and hinder the production of vegetation. Where deep gullies have artificially drained the site, a combination of grazing management and engineering practices may be needed to return the site to its productive potential.

The San Mateo soil is limited as a site for livestock

ponds because of seepage, but the Sparank soil is suitable as a site for these ponds. The soils are suited to such management practices as deferred grazing, rotation grazing, livestock pipelines, and fencing. Good grazing management can increase the productivity and reproduction potential of western wheatgrass, alkali sacaton, and winterfat.

259—Mikim loam, 1 to 5 percent slopes. This deep, well drained soil is on fan terraces and valley sides. It formed in mixed alluvium. Areas are irregular in shape and are 100 to 800 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,800 to 6,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 120 to 150 days.

Typically, the surface layer is pale brown loam about 4 inches thick. The underlying material to a depth of 60 inches is pale brown and light yellowish brown sandy clay loam and clay loam.

Included in this unit are small areas of San Mateo and Sparank soils in drainageways and depressions; Penistaja, Zia, and Palma soils on fan terraces; and Suwanee soils along drainageways. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Mikim soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing. The potential natural plant community is mainly western wheatgrass, blue grama, New Mexico feathergrass, and galleta. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass decreases in abundance and blue grama increases. Blue grama generally occurs in small amounts in the potential natural plant community.

This unit is suited to such management practices as livestock pipelines, range seeding, and brush control. It is not suitable as a site for livestock ponds because of seepage in the underlying material. Good grazing management can increase the productivity and reproduction potential of western wheatgrass.

262—Poley-Pojoaque very cobbly loams, 5 to 30 percent slopes. This map unit is on mesa breaks. Areas are irregular in shape and are 300 to 4,000 acres in size. The native vegetation is mainly grasses, shrubs, and trees. Elevation is 6,200 to 6,900 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 50 percent Poley very cobbly loam and 30 percent Pojoaque very cobbly loam. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Mion soils on hills, Penistaja and Hagerman soils on fan terraces, and Rock outcrop on hills and ridges. Included areas make up about 20 percent of the total acreage.

The Poley soil is deep and well drained. It formed in alluvium and colluvium derived dominantly from sandstone and shale. Typically, the surface layer is dark brown very cobbly loam about 2 inches thick. The upper part of the subsoil is dark brown gravelly clay loam about 16 inches thick, and the lower part to a depth of 60 inches is yellowish brown loam. In some areas the subsoil has more than 35 percent rock fragments.

Permeability is slow in the Poley soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Pojoaque soil is deep and well drained. It formed in alluvium and colluvium derived dominantly from shale and sandstone. Typically, the surface layer is brown very cobbly loam about 3 inches thick. The subsurface layer is brown gravelly clay loam about 4 inches thick. The underlying material to a depth of 60 inches is light yellowish brown and very pale brown cobbly clay loam and gravelly sandy clay loam. In some areas it has more than 35 percent rock fragments.

Permeability is moderate in the Pojoaque soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is mainly blue grama, sideoats grama, black grama, New Mexico feathergrass, and sacahuista. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, sideoats grama and black grama decrease in abundance and blue grama, threeawn, and sacahuista increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is limited as a site for such management practices as livestock pipelines and ponds because of the slope. Good grazing management can increase the

productivity and reproduction potential of black grama and sideoats grama.

264—Tapia sandy loam, 1 to 5 percent slopes. This deep, well drained soil is on fan terraces. It formed in mixed alluvium. Areas are irregular in shape and are 500 to 1,200 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 6,200 to 6,900 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 120 to 150 days.

Typically, the surface layer is brown sandy loam about 4 inches thick. The upper 19 inches of the subsoil is brown clay loam and sandy clay loam, the next 17 inches is very pale brown cobbly sandy loam, and the lower part to a depth of 60 inches is very pale brown cobbly sand.

Included in this unit are small areas of Penistaja, Mikim, Hagerman, and Poley soils on fan terraces; San Mateo and Sparank soils on alluvial fans and in drainageways; and, on fan terraces, soils that are similar to the Tapia soil but have more than 35 percent rock fragments. Included areas make up about 20 percent of the total acreage.

Permeability is moderate in the Tapia soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing. The potential natural plant community is mainly western wheatgrass, blue grama, New Mexico feathergrass, and galleta. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass decreases in abundance and blue grama increases. Blue grama generally occurs in small amounts in the potential natural plant community.

This unit is suited to such management practices as livestock pipelines, range seeding, and brush control. It is not suitable as a site for livestock ponds because of seepage. Good grazing management can increase the productivity and reproduction potential of western wheatgrass.

270—Charo loam, 0 to 5 percent slopes. This moderately deep, well drained soil is on hills and mesa tops. It formed in mixed alluvium and windblown sediments over basalt. Areas are irregular in shape and are 150 to 500 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 7,800 to 8,200 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface layer is dark brown loam about 5 inches thick. The upper 6 inches of the subsoil is reddish brown clay loam, and the lower 17 inches is reddish brown clay and clay loam. Basalt is at a depth of about 28 inches. In some areas the surface layer is clay loam. In other areas the soil has as much as 15 percent rock fragments.

Included in this unit are small areas of Cebolleta and Borrego soils on hills and mesa tops, Rock outcrop on hillsides, and Trag soils in swales. Included areas make up about 20 percent of the total acreage.

Permeability is slow in the Charo soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wildlife habitat.

The potential natural plant community on this unit is mainly mountain muhly, Arizona fescue, muttongrass, and prairie junegrass. The average annual production of air-dry vegetation ranges from 1,050 pounds per acre in favorable years to 650 pounds in unfavorable years. If the plant community deteriorates, mountain muhly and prairie junegrass decrease in abundance and needleandthread and blue grama increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is suited to such management practices as range seeding and livestock pipelines. It is not suitable as a site for livestock ponds because of the depth to bedrock.

272—Cebolleta-Borrego-Rock outcrop complex, 1 to 15 percent slopes. This map unit is on hills and mesas. Areas are irregular in shape and are 500 to 1,000 acres in size. The native vegetation is mainly grasses and trees. Elevation is 7,500 to 8,200 feet. The average annual precipitation is about 18 to 22 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 35 percent Cebolleta cobbly loam, 1 to 15 percent slopes, very stony; 30 percent Borrego gravelly loam, 1 to 15 percent slopes; and 20 percent Rock outcrop. The Cebolleta soil is on mesa tops and hills, the Borrego soil is on mesas and hilltops, and the Rock outcrop is on hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Charo soils on hillsides and mesa tops and Trag soils in swales. Also

included, on hilltops, are soils that are similar to the Borrego soil but have more rock fragments in the subsoil. Included areas make up about 15 percent of the total acreage.

The Cebolleta soil is moderately deep and well drained. It formed in alluvium and windblown sediments derived dominantly from basalt and andesite. Typically, the surface layer is brown cobbly loam about 2 inches thick. The next layer is brown very cobbly clay loam about 6 inches thick. The subsoil is strong brown and brown very cobbly clay about 17 inches thick. Basalt is at a depth of about 25 inches.

Permeability is slow in the Cebolleta soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Borrego soil is shallow and well drained. It formed in alluvium and windblown sediments derived dominantly from basalt and andesite. Typically, the surface layer is brown gravelly loam about 4 inches thick. Below this is brown gravelly clay about 14 inches thick. Basalt is at a depth of about 18 inches.

Permeability is very slow in the Borrego soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt on hills and mesa tops.

This unit is used for livestock grazing and wood products.

In some areas pinyon, juniper, and scattered ponderosa pine are at the lower elevations. The site index for ponderosa pine ranges from 54 to 64. Based on a site index of 60, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber on this unit are seedling mortality, the hazard of windthrow, equipment limitations, and the stones on the surface. The stones can interfere with felling, yarding, and other activities involving the use of equipment. The seedling mortality rate is moderate because of the depth to bedrock, the clayey texture, and the available water capacity. Trees are subject to windthrow because of the limited rooting depth.

The understory vegetation on this unit is mainly Arizona fescue, Gambel oak, blue grama, muttongrass, western wheatgrass, and bottlebrush squirreltail.

276—Trag loam, 1 to 8 percent slopes. This deep, well drained soil is on valley sides. It formed in mixed alluvium. Areas are irregular in shape and are 50 to 100 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 7,800 to 8,900 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 40 to 46 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface layer is brown loam about 3 inches thick. The subsoil is about 21 inches of reddish brown sandy clay loam and clay loam. The substratum to a depth of 60 inches is brown and light brown sandy clay loam.

Included in this unit are small areas of McGaffey soils in swales and Charo and Cebolleta soils on hills. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Trag soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing. The potential natural plant community is mainly mountain muhly, Arizona fescue, muttongrass, and prairie junegrass. The average annual production of air-dry vegetation ranges from 1,050 pounds per acre in favorable years to 650 pounds in unfavorable years. If the plant community deteriorates, mountain muhly and prairie junegrass decrease in abundance and Poa and blue grama increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is suited to such management practices as range seeding, ponds, and livestock pipelines.

278—Microy-Rock outcrop complex, 5 to 30 percent slopes. This map unit is on hills. Areas are circular or irregular in shape and are 100 to 300 acres in size. The native vegetation is mainly grasses and trees. Elevation is 8,000 to 8,900 feet. The average annual precipitation is about 18 to 22 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 90 to 100 days.

This unit is 55 percent Microy cobbly loam, 5 to 30 percent slopes, and 25 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Borrego, Cebolleta, and Raton soils on hills. Included areas make up about 20 percent of the total acreage.

The Microy soil is moderately deep and well drained. It formed in mixed alluvium. Typically, the surface layer

is brown cobbly loam about 3 inches thick. The subsoil is dark reddish gray and reddish brown cobbly clay about 25 inches thick. The substratum is reddish brown very cobbly clay about 8 inches thick. Basalt is at a depth of about 36 inches. In some areas the surface layer is loam.

Permeability is slow in the Microy soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt on hills.

This unit is used for wood products and livestock grazing.

The Microy soil is suited to the production of ponderosa pine. The site index for ponderosa pine averages 50. Based on a site index of 50, the potential production of merchantable timber is 2,500 cubic feet, or 9,200 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of erosion, equipment limitations, plant competition, and a slow growth rate. When timber is harvested, minimizing the risk of erosion is essential. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Constructing water bars and seeding cut and filled areas can protect logging roads and landings against erosion. Conventional methods of harvesting timber generally can be used, but their use may be limited when the soil is wet. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Brushy plants, such as Gambel oak, limit the natural regeneration of ponderosa pine. Thinning the stand can help to accelerate the growth of desirable trees.

The understory vegetation on this unit is Arizona fescue, mountain muhly, western wheatgrass, and Gambel oak.

282—Cebolleta cobbly loam, 2 to 10 percent slopes, very stony. This moderately deep, well drained soil is on hills. It formed in alluvium and windblown sediments derived dominantly from basalt and andesite. Areas are irregular in shape and are 100 to 1,500 acres in size. The native vegetation is mainly trees, grasses, and shrubs. Elevation is 7,900 to 9,100 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 80 to 100 days.

Typically, the surface layer is dark grayish brown cobbly loam about 4 inches thick. The next layer is dark grayish brown very cobbly loam about 6 inches thick. The subsoil is reddish brown very cobbly clay about 15 inches thick. Basalt is at a depth of about 25 inches.

Included in this unit are small areas of soils that are similar to the Cebolleta soil but have a light colored surface layer. These soils are on hills. Also included are Borrego soils on hilltops, Charo soils on hills, and Rock outcrop on ridges and hills. Included areas make up about 20 percent of the total acreage.

Permeability is slow in the Cebolleta soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

This unit is used for livestock grazing and commercial wood products.

This unit is moderately suited to the production of ponderosa pine at elevations above 8,000 feet and poorly suited at elevations below 8,000 feet. The site index for ponderosa pine ranges from 53 to 62 above 8,000 feet and from 43 to 47 below 8,000 feet. Based on a site index of 50, the potential production of merchantable timber is 2,500 cubic feet, or 9,200 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 38 cubic feet, or 130 board feet (International rule ⅛-inch kerf), per acre.

The main concerns in producing and harvesting ponderosa pine are the stones on the surface, plant competition, and a slow growth rate. The stones can interfere with felling, yarding, and other activities involving the use of equipment. Unless the site is adequately prepared, competition from undesirable plants can prevent or delay the natural or artificial regeneration of trees. Understory grasses and brushy plants limit the natural regeneration of ponderosa pine at elevations below 8,000 feet. Thinning the stand can help to accelerate the growth of desirable trees. When timber is harvested, minimizing the risk of erosion is essential. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality.

The understory vegetation on this unit is mainly Arizona fescue, mountain muhly, and prairie junegrass at elevations above 8,000 feet and blue grama, little bluestem, and mountainmahogany at elevations below 8,000 feet.

284—Cebolleta-Rock outcrop complex, 15 to 50 percent slopes. This map unit is on mountains. Areas are irregular in shape and are 100 to 1,000 acres in size. The native vegetation is mainly trees, shrubs, and grasses. Elevation is 7,700 to 9,400 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 80 to 100 days.

This unit is 65 percent Cebolleta very cobbly loam, 15 to 50 percent slopes, very stony, and 20 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of soils that are similar to the Cebolleta soil but have a light colored surface layer. These soils are on mountainsides. Also included are small areas of Borrego soils on mountainsides and benches. Included areas make up about 15 percent of the total acreage.

The Cebolleta soil is moderately deep and well drained. It formed in alluvium and colluvium derived dominantly from basalt and andesite. Typically, the surface layer is dark grayish brown very cobbly loam about 5 inches thick. The subsurface layer is grayish brown very cobbly loam about 5 inches thick. The subsoil is brown very cobbly clay about 14 inches thick. Basalt is at a depth of about 24 inches. In some areas the slope is less than 15 percent.

Permeability is slow in the Cebolleta soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt and andesite on mountainsides and benches.

This unit is used for livestock grazing and commercial wood products.

The Cebolleta soil is suited to the production of ponderosa pine and Douglas fir. The site index for ponderosa pine ranges from 52 to 64. Based on a site index of 60, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting ponderosa pine and Douglas fir are the slope and the stones on the surface. Conventional methods of harvesting timber can be used in the less sloping areas, but their use is limited in the steeper areas. Properly designing logging roads, skid trails, and landings helps to overcome the slope. Erosion-control structures and seeding are needed to protect the roads against erosion. The stones can interfere with felling, yarding, and other activities involving the use of equipment. Such plants as Gambel oak, alligator juniper, and pinyon delay natural regeneration but do not prevent the eventual development of a fully stocked, normal stand of trees.

The understory vegetation on this unit is mainly Arizona fescue, mountain muhly, yarrow, and mountainmahogany.

286—Cebolleta-Raton complex, 1 to 5 percent slopes. This map unit is on hills and mesa tops. Areas are irregular in shape and are 500 to 1,000 acres in size. The native vegetation is mainly trees, shrubs, and grasses. Elevation is 8,400 to 8,800 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 80 to 100 days.

This unit is 60 percent Cebolleta very cobbly loam, 1 to 5 percent slopes, very stony, and 25 percent Raton cobbly loam, 1 to 5 percent slopes, very stony. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Charo soils and Rock outcrop on hills and mesa tops, Microy soils on hills, and Trag soils along drainageways. Included areas make up about 15 percent of the total acreage.

The Cebolleta soil is moderately deep and well drained. It formed in alluvium and windblown sediments derived dominantly from basalt. Typically, the surface layer is dark brown very cobbly loam about 3 inches thick. The subsurface layer is dark brown very cobbly clay loam about 6 inches thick. The subsoil is brown and reddish brown very cobbly clay about 19 inches thick. Basalt is at a depth of about 28 inches.

Permeability is slow in the Cebolleta soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Raton soil is shallow and well drained. It formed in alluvium and windblown sediments derived dominantly from igneous rock. Typically, the surface layer is dark yellowish brown cobbly loam about 3 inches thick. The subsurface layer is brown very cobbly clay loam about 3 inches thick. The subsoil is brown very cobbly clay about 4 inches thick. Basalt is at a depth of about 10 inches.

Permeability is slow in the Raton soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water

erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used for livestock grazing and commercial wood products.

This unit is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 59 to 61. Based on a site index of 60, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

Conventional methods of harvesting timber can be used. Carefully managing reforestation can minimize competition from undesirable understory plants. Brushy plants, such as Gambel oak, limit the natural regeneration of ponderosa pine.

The main concerns in producing and harvesting timber on the Cebolleta soil are seedling mortality and the hazard of windthrow. The seedling mortality rate is moderate because of the very low available water capacity. Trees commonly are subject to windthrow during periods when the soil is excessively wet and winds are strong.

The main concerns in producing and harvesting of timber on the Raton soil are equipment limitations, seedling mortality, and the hazard of windthrow. Rock outcrop restricts the movement of equipment, and sharp, angular cobbles and stones cause abnormal wear of rubber-tired equipment. The seedling mortality rate is moderate because of the very low available water capacity and the restricted rooting depth. Trees are subject to windthrow because of the restricted rooting depth.

The understory vegetation on this unit is Arizona fescue, blue grama, western wheatgrass, and Gambel oak.

290—Paguate-Hackroy complex, 1 to 5 percent slopes. This map unit is on basalt-capped mesa tops and plateaus. Areas are irregular in shape and are 100 to 1,300 acres in size. The native vegetation is mainly grasses, forbs, and trees. Elevation is 7,000 to 8,000 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 47 to 52 degrees F, and the average frost-free period is 110 to 130 days.

This unit is 50 percent Paguate loam, 1 to 5 percent slopes, and 35 percent Hackroy cobbly loam, 1 to 5 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Cabezon soils on mesas and ridges; on mesas and plateaus, soils that are similar to the Hackroy and Paguate soils but have more rock fragments in the subsoil; Millpaw soils in upland drainageways and depressions; and Rock outcrop on the edges of mesas and on ridges. Included areas make up about 15 percent of the total acreage.

The Paguate soil is moderately deep and well drained. It formed in mixed alluvium and windblown sediments over basalt. Typically, the surface layer is dark brown loam about 3 inches thick. The upper 16 inches of the subsoil is reddish brown clay loam and clay, and the lower 14 inches is pink gravelly clay loam. Basalt is at a depth of about 33 inches.

Permeability is slow in the Paguate soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Hackroy soil is shallow and well drained. It formed in mixed alluvium and windblown sediments over basalt. Typically, the surface layer is brown cobbly loam about 3 inches thick. The upper part of the subsoil is reddish brown clay loam about 8 inches thick, and the lower part is reddish brown clay about 3 inches thick. Basalt is at a depth of about 14 inches.

Permeability is slow in the Hackroy soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for livestock grazing, wildlife habitat, and limited wood products.

The potential natural plant community on the Paguate soil is mainly blue grama, spike muhly, western wheatgrass, fourwing saltbush, and winterfat. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and spike muhly decrease in abundance and blue grama, ring muhly, sand dropseed, pinyon, and oneseed juniper increase. The increasers generally occur in small amounts in the potential natural plant community.

The Paguate soil is suited to such management practices as livestock pipelines, fencing, and range seeding. It is not suitable as a site for livestock ponds because of the depth to bedrock. Good grazing management can increase the productivity and reproduction potential of western wheatgrass and spike muhly.

The potential natural plant community on the Hackroy soil is mainly blue grama, sideoats grama, black grama, little bluestem, and western wheatgrass. The average annual production of air-dry vegetation ranges from

1,100 pounds per acre in favorable years to 425 pounds in unfavorable years. If the plant community deteriorates, sideoats grama, black grama, and western wheatgrass decrease in abundance and blue grama, threeawn, and pinyon increase. The increasers generally occur in small amounts in the potential natural plant community.

The suitability of the Hackroy soil for such management practices as livestock pipelines and range seeding is limited because of the depth to bedrock and the available water capacity. Good grazing management can increase the productivity and reproduction potential of western wheatgrass, spike muhly, sideoats grama, and black grama.

291—Paguate cobbly clay loam, 1 to 5 percent slopes. This moderately deep, well drained soil is on basalt-capped mesa tops and plateaus. It formed in mixed alluvium and windblown sediments. Areas are irregular in shape and are 100 to 2,500 acres in size. The native vegetation is mainly trees, grasses, and forbs. Elevation is 7,000 to 8,000 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 130 days.

Typically, the surface layer is dark yellowish brown cobbly clay loam about 5 inches thick. The upper part of the subsoil is strong brown and brown clay about 21 inches thick, and the lower part is reddish yellow clay loam about 12 inches thick. Basalt is at a depth of about 38 inches. In some areas the surface layer is clay loam.

Included in this unit are small areas of Cabezon soils on mesa tops, hills, and ridges; Millpaw soils in swales; and Rock outcrop on ridges, hills, and the edges of mesas. Also included are some areas near the boundary of Catron County where temperatures are slightly cooler and some areas near the boundary of Socorro County where the surface layer is darker. Included areas make up about 20 percent of the total acreage.

Permeability is slow in the Paguate soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wood products.

The site index for pinyon and juniper on this unit ranges from 30 to 50. Based on a site index of 40, the soil can produce 6 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

Grasses, forbs, and shrubs limit the natural regeneration of woody species. Properly preparing the site can control the competing vegetation.

The understory vegetation on this unit is western wheatgrass, bluegrass, bottlebrush squirreltail, oak, and pinyon ricegrass. The production of understory plants can be increased by reducing the density of the canopy.

294—Parkay-Rock outcrop complex, 15 to 45 percent slopes. This map unit is on mountains, ridges, hills, and escarpments. Areas are irregular in shape and are 200 to 1,100 acres in size. The native vegetation is mainly trees, shrubs, and grasses. Elevation is 8,200 to 10,300 feet. The average annual precipitation is about 22 to 26 inches, the average annual air temperature is 36 to 42 degrees F, and the average frost-free period is 60 to 80 days.

This unit is 60 percent Parkay stony loam, 15 to 45 percent slopes, extremely stony, and 25 percent Rock outcrop. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Trag soils on ridges, mountains, and hills. Also included, on side slopes and ridges, are soils that are similar to the Parkay soil but are moderately deep over shale. Included areas make up about 15 percent of the total acreage.

The Parkay soil is deep and well drained. It formed in colluvium and alluvium derived dominantly from basalt and andesite. Typically, the surface layer is dark grayish brown stony loam about 2 inches thick. The subsurface layer is dark grayish brown very gravelly sandy clay loam about 6 inches thick. The subsoil is brown very cobbly sandy clay loam about 15 inches thick. The substratum to a depth of 60 inches is brown and light brown very cobbly sandy clay loam. In some areas the slope is less than 15 percent.

Permeability is moderate in the Parkay soil. Available water capacity also is moderate. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt and andesite on escarpments, mountains, hills, and ridges.

This unit is used for wood products and livestock grazing.

The Parkay soil is suited to the production of Douglas fir and Engelmann spruce. At the lower elevations, it is suited to the production of ponderosa pine. The site index for Douglas fir ranges from 70 to 85. The site index for Engelmann spruce ranges from 69 to 85 where slopes are 15 to 35 percent and from 76 to 96 where slopes are 35 to 45 percent. The site index

for ponderosa pine ranges from 56 to 76 in less sloping areas. Douglas fir and Engelmann spruce can be grown as Christmas trees.

Based on a site index of 75 for Douglas fir, the potential production of merchantable timber is 4,945 cubic feet, or 26,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 62 cubic feet, or 271 board feet (International rule, ⅛-inch kerf), per acre.

Based on a site index of 80 for Engelmann spruce, the potential production of merchantable timber is 4,360 cubic feet, or 21,800 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 76 cubic feet per acre.

The main concerns in producing and harvesting Engelmann spruce and Douglas fir are the hazard of erosion in the steeper areas, equipment limitations, and plant competition. When timber is harvested, minimizing the risk of erosion is essential. Conventional methods of harvesting can be used in the less sloping areas, but their use is restricted in the steeper areas. Areas that have slopes of more than 35 percent are not suited to conventional methods of harvesting. Stones on the surface can interfere with felling, yarding, and other activities involving the use of equipment, and Rock outcrop can restrict the movement of equipment. Special design of logging roads, skid trails, and landings is needed in the steeper areas. Erosion-control structures and seeding can protect the roads against erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Aspen may limit the natural regeneration of Engelmann spruce and Douglas fir.

The understory vegetation on this unit is Arizona fescue, pyrola, violet, Fendler meadowrue, currant, and gooseberry. It is very sparse because of the dense canopy.

300—Saladon clay loam, 0 to 5 percent slopes. This deep, poorly drained soil is in valleys and drainageways. It formed in mixed alluvium. Areas are long and narrow and are 20 to 100 acres in size. The native vegetation is mainly grasses and sedges. Elevation is 7,900 to 8,300 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface layer is dark brown clay loam about 4 inches thick. The underlying material to a depth of 60 inches is black, yellowish brown, grayish brown, and very dark gray sandy clay and clay.

Included in this unit are small areas of McGaffey soils in valleys, soils that are similar to the Saladon soil but are well drained and are on valley sides, Moreno soils on valley sides, and soils that are similar to the Saladon soil but are less clayey. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Saladon soil. Available water capacity is high. A high water table limits the effective rooting depth to 15 to 35 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight. A seasonal high water table fluctuates between depths of 18 to 36 inches. This soil is subject to rare flooding.

This unit is used for livestock grazing. The potential natural plant community is mainly tufted hairgrass, western wheatgrass, sedges, rushes, and bluegrass. The average annual production of air-dry vegetation ranges from 3,000 pounds per acre in favorable years to 2,500 pounds in unfavorable years. If the plant community deteriorates, tufted hairgrass and wheatgrass decrease in abundance and bluegrass and sedges increase. The increasers generally occur in small amounts in the potential natural plant community. Deterioration of the vegetation on this unit often results in the formation of gullies that drain the site and hinder production. After gullies have drained the site, a combination of grazing management and engineering practices may be required to return the site to its productive potential.

This unit is suited to such management practices as range seeding and livestock ponds.

310—Mirabal very gravelly loam, 2 to 15 percent slopes. This moderately deep, well drained soil is on hills. It formed in mixed alluvium and windblown sediments. Areas are irregular in shape and are 100 to 1,200 acres in size. The native vegetation is mainly trees and a sparse understory of grasses. Elevation is 8,100 to 8,800 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 85 to 105 days.

Typically, the surface layer is brown very gravelly loam about 3 inches thick. The upper part of the underlying material is light brown very gravelly loam about 11 inches thick, and the lower part is pink very cobbly sandy clay loam about 7 inches thick. Granite is at a depth of about 21 inches.

Included in this unit are small areas of soils that are similar to the Mirabal soil but are shallow over bedrock. These soils are on hills. Also included are small areas

of Moreno soils on fan terraces and in valleys and Rock outcrop on hilltops. Included areas make up about 15 percent of the total acreage.

Permeability is moderate in the Mirabal soil. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for wood products and livestock grazing.

This unit is suited to the production of ponderosa pine. The steeper, north-facing slopes also are suited to the production of Douglas fir for timber. The Douglas fir also can be grown as a Christmas tree species. The site index for ponderosa pine ranges from 50 to 67. The site index for Douglas fir is 62. Based on a site index of 60 for both species, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of water erosion, seedling mortality, and the hazard of windthrow. When timber is harvested, minimizing the risk of erosion is essential. Erosion-control structures and seeding can protect logging roads against erosion. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality. Because of the very low available water capacity, the restricted rooting depth, and a high evaporation rate, the seedling mortality rate is low on the north-and east-facing slopes and moderate on the south- and west-facing slopes. During some periods of heavy rainfall or snowmelt, the soil is saturated and thus trees are subject to windthrow.

The understory vegetation on this unit is scattered Arizona fescue, mountain muhly, and bottlebrush squirreltail.

315—Abersito, cobbly-Abersito-Rock outcrop association, 5 to 30 percent slopes. This map unit is on hills and mesas. Areas are irregular in shape and are 50 to 450 acres in size. The native vegetation is mainly trees and a sparse understory of grasses. Elevation is 8,300 to 8,800 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 85 to 105 days.

This unit is 35 percent Abersito very cobbly sandy clay loam, 15 to 30 percent slopes, very stony; 30 percent Abersito gravelly loam, 5 to 10 percent slopes; and 20 percent Rock outcrop. The cobbly Abersito soil is on hills and the sides of mesas, the other Abersito soil is on hills and mesa tops, and the Rock outcrop is on escarpments, ridges, and ledges.

Included in this unit are small areas of shallow soils on hills and mesas, deep soils on hillsides, and Cinnadale soils on mesa tops. Also included, on mesas and hills, are soils that are similar to the Abersito soil but are less clayey in the subsoil. Included areas make up about 15 percent of the total acreage.

The cobbly Abersito soil is moderately deep and well drained. It formed in mixed alluvial and colluvial material. Typically, a thin mat of partially decomposed pine needles and oak leaves is on the surface. The surface layer is dark brown very cobbly sandy clay loam about 3 inches thick. The subsurface layer is light brown very cobbly fine sandy loam about 6 inches thick. The subsoil is yellowish red very cobbly clay about 15 inches thick. Sandstone bedrock is at a depth of about 24 inches.

The other Abersito soil is moderately deep and well drained. It formed in mixed alluvial and colluvial material. Typically, a thin mat of partially decomposed pine needles and oak leaves is on the surface. The surface layer is brown gravelly loam about 5 inches thick. The subsoil is brown and strong brown very cobbly clay about 19 inches thick. Sandstone is at a depth of about 24 inches.

Permeability is slow in the Abersito soils. Available water capacity is very low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Rock outcrop consists of barren or nearly barren areas of sandstone on escarpments and ridges.

This unit is used for wood products and livestock grazing.

The Abersito soils are suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 64 to 68. Based on a site index of 65, the potential production of merchantable timber is 4,025 cubic feet, or 8,300 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 50 cubic feet, or 203 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of water erosion, the slope, seedling mortality, plant competition, and the hazard of windthrow. When timber is harvested, minimizing the risk of erosion is essential. Conventional methods of harvesting can be used in the less sloping areas, but their use is restricted in the steeper areas. Special design of logging roads, skid trails, and landings is

needed in the steeper areas. Erosion-control structures and seeding can protect the roads against erosion. Proper design of road drainage systems and care in the placement of culverts also help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Stones on the surface can interfere with felling, yarding, and other activities involving the use of equipment.

Overall, the seedling mortality rate is moderate. The rate, however, is slightly lower on the north- and east-facing slopes than on the south- and west-facing slopes. Carefully managing reforestation can minimize competition from undesirable understory plants. Unless the site is adequately prepared, plant competition can prevent or delay the natural or artificial regeneration of trees. Brushy plants, such as Gambel oak, limit the natural regeneration of ponderosa pine. During some periods of heavy rainfall or snowmelt, the soils are saturated and thus trees are subject to windthrow.

The understory vegetation on this unit is Arizona fescue, mountain muhly, little bluestem, and Gambel oak.

This unit is limited as a site for such management practices as livestock pipelines and fencing because of the large stones, the depth to bedrock, and the Rock outcrop.

320—Cinnadale gravelly very fine sandy loam, 1 to 15 percent slopes. This shallow, well drained soil is on ridges and hills. It formed in alluvium and windblown sediments derived dominantly from sandstone and siltstone. Areas are irregular in shape and are 200 to 1,500 acres in size. The native vegetation is mainly trees and an understory of grasses (fig. 6). Elevation is 7,800 to 8,400 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface layer is light reddish brown gravelly very fine sandy loam about 4 inches thick. The subsoil is light reddish brown very channery loam about 8 inches thick. Sandstone is at a depth of about 12 inches. In some areas the bedrock is weathered in the upper few inches.

Included in this unit are small areas of Rock outcrop, small areas of soils that are similar to the Cinnadale soil but are moderately deep, and small areas of Stout soils. All of these included areas are on hills and ridges. Also included are small areas of Moreno and Moreno Variant soils on hills. Included areas make up about 15 percent of the total acreage.

Permeability is moderately rapid in the Cinnadale soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for wood products and livestock grazing.

The Cinnadale soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 61 to 68. Based on a site index of 65, the potential production of merchantable timber is 4,025 cubic feet, or 8,300 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 50 cubic feet, or 203 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of water erosion, seedling mortality, and the hazard of windthrow. When timber is harvested, minimizing the risk of erosion is essential. Constructing water bars and seeding cut and filled areas can protect logging roads and landings against erosion. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality.

Because of the very low available water capacity, the shallow rooting depth, and a high evaporation rate, the seedling mortality rate is moderate. During some periods of heavy rainfall or snowmelt, the soil is saturated and thus trees are subject to windthrow.

The understory vegetation on this unit is Arizona fescue, mountain muhly, prairie junegrass, bottlebrush squirreltail, and Fendler ceanothus.

325—Moreno Variant loam, 2 to 10 percent slopes. This deep, well drained soil is on fan terraces and toe slopes. It formed in mixed alluvium. Areas are irregular in shape and are 25 to 150 acres in size. The native vegetation is mainly grasses and trees. Elevation is 8,000 to 8,300 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 85 to 105 days.

Typically, the surface layer is dark brown loam about 7 inches thick. The subsurface layer is brown and strong brown very fine sandy loam about 15 inches thick. The subsoil to a depth of 60 inches is red clay loam and sandy clay loam.

Included in this unit are small areas of Moreno soils on fan terraces, Saladon soils along narrow drainageways, Cinnadale soils on hills and ridges, and soils that are similar to the Moreno Variant soil but are moderately deep and are on fan terraces and ridges. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Moreno Variant soil. Available water capacity is high. The

Figure 6.—Ponderosa pine in an area of Cinnadale gravelly very fine sandy loam, 1 to 15 percent slopes.

effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

This unit is used for livestock grazing and wood products.

This unit is suited to the production of ponderosa pine. The site index ranges from 85 to 90. Based on a site index of 85, the potential production of merchantable timber is 6,055 cubic feet, or 35,750 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 77 cubic feet, or 357 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. When timber is harvested, minimizing the risk of erosion is essential. Constructing water bars and seeding cut and filled areas can protect logging roads and landings against erosion. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality. Carefully managing reforestation can minimize competition from undesirable understory plants. Grasses, forbs, and shrubs limit the natural regeneration of ponderosa pine. Properly preparing the site can control competing vegetation.

The understory vegetation on this unit is Arizona fescue, mountain muhly, and western wheatgrass.

330—Moreno loam, 1 to 10 percent slopes. This deep, well drained soil is on fan terraces. It formed in mixed alluvium. Areas are irregular in shape and are 150 to 800 acres in size. The native vegetation is mainly ponderosa pine and grasses. Elevation is 7,800 to 8,200 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, a thin mat of pine needles is on the surface. The surface layer is reddish brown loam about 11 inches thick. The upper 3 inches of the subsoil is yellowish red loam, the next 21 inches is red clay loam and reddish brown clay, and the lower part to a depth of 60 inches is red very gravelly clay loam.

Included in this unit are small areas of Yankee soils on valley bottoms and Moreno Variant soils on fan terraces. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Moreno soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for wood products and livestock grazing.

This unit is suited to the production of ponderosa pine. The site index ranges from 70 to 90. Based on a site index of 80, the potential production of merchantable timber is 5,410 cubic feet, or 31,200 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 69 cubic feet, or 313 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. When timber is harvested, minimizing the risk of erosion is essential. Constructing water bars and seeding cut and filled areas can protect logging roads and landings against erosion. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality. Carefully managing reforestation can minimize competition from undesirable understory plants. Grasses, forbs, and shrubs limit the natural regeneration of ponderosa pine. Properly preparing the site can control competing vegetation.

The understory vegetation on this unit is Arizona fescue, mountain muhly, and western wheatgrass.

340—Yankee silty clay loam, 0 to 3 percent slopes. This deep, well drained soil is on the bottom of mountain valleys. It formed in mixed alluvium. Areas are irregular in shape and are 50 to 800 acres in size. The native vegetation is mainly grasses. Elevation is 7,700 to 8,300 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface layer is dark reddish brown silty clay loam about 3 inches thick. The subsoil to a depth of 60 inches is dark reddish brown, dark reddish gray, and reddish brown silty clay.

Included in this unit are small areas of McGaffey and Moreno soils on valley sides. Included areas make up about 15 percent of the total acreage.

Permeability is slow in the Yankee soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight. The soil has cracks that extend from the surface to a depth of about 20 inches.

This unit is used for livestock grazing. The potential natural plant community is mainly tufted hairgrass, western wheatgrass, and bluegrass. The average annual production of air-dry vegetation ranges from 3,000 pounds per acre in favorable years to 2,500 pounds in unfavorable years. If the plant community deteriorates, tufted hairgrass and wheatgrass decrease in abundance and bluegrass increases. The increasers generally occur in small amounts in the potential natural plant community.

Deterioration of the vegetation on this unit often results in the formation of gullies that drain the site and hinder the production of vegetation. After gullies have drained the site, a combination of grazing management and engineering practices may be needed to return the site to its productive potential. The unit is suited to such management practices as range seeding and livestock ponds.

350—Rock outcrop-Stout complex, 3 to 15 percent slopes. This map unit is on ridges and hills. Areas are irregular in shape. The native vegetation is mainly trees, shrubs, and grasses. Elevation is 7,800 to 8,500 feet. The average annual precipitation is about 20 to 24 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 60 percent Rock outcrop and 25 percent Stout sandy loam, 3 to 15 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Cinnadale soils on hills and ridges and Mirabal soils on ridges. Also included, on hills, are soils that are similar to the Stout soil but are moderately deep. Included areas make up about 15 percent of the total acreage.

The Rock outcrop consists of barren or nearly barren areas of exposed sandstone on hills and ridges.

The Stout soil is very shallow or shallow and is well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface is covered with partially decomposed pine needles. The surface layer is brown sandy loam about 3 inches thick. The underlying material is brown sandy loam about 11 inches thick. Sandstone is at a depth of about 14 inches.

Permeability is moderately rapid in the Stout soil. Available water capacity is very low. The effective rooting depth is 6 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

This unit is used for wood products and livestock grazing.

The Stout soil is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 45 to 54. Based on a site index of 50, the potential production of merchantable timber is 2,500 cubic feet, or 9,200 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 38 cubic feet, or 130 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting ponderosa pine are the hazard of erosion, seedling mortality, plant competition, and the hazard of windthrow. When timber is harvested, minimizing the risk of erosion is essential. Soil blowing can be controlled and damage to seedlings minimized by maintaining enough plant residue on the surface. The seedling mortality rate is high because of the very low available water capacity. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. During some periods of heavy rainfall or snowmelt, the soil is saturated and thus trees are subject to windthrow. Conventional methods of harvesting timber can be used, but the Rock outcrop can interfere with cross-slope movement.

The understory vegetation on this unit is mountain muhly, bottlebrush squirreltail, little bluestem, and Gambel oak.

406—Poley-Rock outcrop complex, 2 to 25 percent slopes. This map unit is on hills, ridges, benches, and the escarpments of basalt mesas. Areas are irregular in shape and are 100 to 8,000 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 5,800 to 7,100 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 45 percent Poley very cobbly loam, 2 to 25 percent slopes, very stony, and 40 percent Rock outcrop. The Poley soil is on benches, ridges, and hills, and the Rock outcrop is on ridges and escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. The soils in areas near the boundary of Socorro County may have a less well developed subsoil.

Included in this unit are small areas of Rana soils on benches and hills, Penistaja soils on hills, and fine textured, shallow and moderately deep soils that are underlain by shale and are on benches and hills. Included areas make up about 15 percent of the total acreage.

The Poley soil is deep and well drained. It formed in colluvium and alluvium derived dominantly from shale. Typically, the surface layer is reddish brown very cobbly loam about 3 inches thick. The upper part of the subsoil is reddish brown and yellowish red clay about 19 inches thick, and the lower part to a depth of 60 inches is light reddish brown and pink clay and clay loam.

Permeability is slow in the Poley soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt on ridges, benches, and escarpments.

This unit is used mainly for livestock grazing. In areas near Grants, it is used for urban development.

The potential natural plant community on the Poley soil is mainly blue grama, sideoats grama, New Mexico feathergrass, black grama, alkali sacaton, and sacahuista. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, black grama, alkali sacaton, and sideoats grama decrease in abundance and blue grama, threeawn, and sacahuista increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is limited as a site for such management practices as livestock pipelines and range seeding because of the Rock outcrop and the low precipitation. Good grazing management can increase the productivity and reproduction potential of black grama and sideoats grama.

This unit is suited to urban development. The main limitations are the slope, the clayey texture, the stones on the surface, and a high shrink-swell potential. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Properly designing buildings and roads can reduce the damaging effects of shrinking and swelling and help overcome the slope and the stones on the surface.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. Extra care is needed during planting to ensure that the soil is firmly packed around the roots. Cultivation or applications of herbicide can help to remove competing vegetation. Drip irrigation can help to establish windbreaks.

407—Viuda-Rock outcrop complex, 1 to 10 percent slopes. This map unit is on ridges, hillsides, and benches on Cerro Verde. Areas are oval and are 2,000 to 4,000 acres in size. The native vegetation is mainly grasses, shrubs, and scattered juniper. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 65 percent Viuda very cobbly silty clay loam, 1 to 10 percent slopes, very stony, and 15 percent Rock outcrop. The Viuda soil is on ridges, hillsides, and benches, and the Rock outcrop is on ridges and breaks and along drainageways. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of soils that are similar to the Viuda soil but are less well developed or are moderately deep. These soils are on ridges and hills. Also included are the cobbly Flaco and Berto soils on ridges and hillsides. Included areas make up about 20 percent of the total acreage.

The Viuda soil is shallow and well drained. It formed in windblown sediments and colluvium derived dominantly from basalt. Typically, the surface layer is brown very cobbly silty clay loam about 3 inches thick. The subsoil is brown clay about 10 inches thick. Basalt is at a depth of about 13 inches.

Permeability is slow in the Viuda soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt on ridges, breaks, and benches.

This unit is used for livestock grazing. The potential natural plant community on the Viuda soil is mainly blue grama, sideoats grama, black grama, little bluestem, and wolftail. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 425 pounds in unfavorable years. If the plant community deteriorates, sideoats grama, black grama, and little bluestem decrease in abundance and blue grama and wolftail increase. The increasers generally occur in small amounts in the potential natural plant community.

The suitability of the Viuda soil for such management practices as livestock pipelines and range seeding is limited because of the depth to bedrock and the low precipitation. Good grazing management can increase the productivity and reproduction potential of sideoats grama, black grama, and little bluestem.

419—Navajo silty clay loam, 1 to 5 percent slopes. This deep, well drained soil is on alluvial fans, in large drainageways, and on flood plains. It formed in alluvium derived dominantly from shale. Areas are irregular in shape and are 30 to 2,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,400 to 6,000 feet. The average annual precipitation is about 7 to 10 inches, the average annual air temperature is 51 to 55 degrees F, and the average frost-free period is 140 to 165 days.

Typically, the surface layer is reddish brown silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches is reddish brown silty clay and clay. Areas near the boundary of Bernalillo County are warmer. In places the surface layer is clay or sandy clay loam.

Included in this unit are small areas of Suwanee soils on alluvial fans and flood plains and Grieta soils on fan terraces. Included areas make up about 15 percent of the total acreage.

Permeability is very slow in the Navajo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer. Cracks are common in the upper 30 inches. The soil is slightly saline.

This unit is used for livestock grazing. The potential natural plant community is mainly giant sacaton, alkali sacaton, vine mesquite, and shadscale. The average annual production of air-dry vegetation ranges from 4,000 pounds per acre in favorable years to 800 pounds in unfavorable years. If the plant community deteriorates, giant sacaton and vine mesquite decrease in abundance and galleta, burrograss, mat muhly, and annual grasses and forbs increase. The increasers generally occur in small amounts in the potential natural plant community.

Good grazing management can increase the productivity and reproduction potential of giant sacaton, alkali sacaton, and vine mesquite. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This soil receives runoff from the adjacent areas. As a result, it is potentially more productive. Deterioration of the plant community often results in the formation of gullies that drain the site and hinder the production of vegetation.

This unit is not suitable for such management practices as range seeding because of the low precipitation.

420—Navajo-Suwanee complex, 1 to 5 percent slopes. This map unit is on flood plains and alluvial fans and in large drainageways. Areas are irregular in shape and are 75 to 2,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,400 to 6,000 feet. The average annual precipitation is about 7 to 10 inches, the average annual air temperature is 51 to 55 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 45 percent Navajo clay loam, 1 to 5 percent slopes, and 40 percent Suwanee silty clay loam, 1 to 5 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. Areas near the boundary of Bernalillo County are warmer.

Included in this unit are small areas of soils that are similar to the Suwanee soil but are more silty. These soils are on flood plains, mainly near the boundary of Socorro County and the boundary of the soil survey of the eastern part of Valencia County. Also included are areas of riverwash at the mouth of drainageways and in arroyos; Grieta soils on fan terraces; and Sheppard and Shiprock soils in windblown areas, mainly near the boundary of the soil survey of the eastern part of Valencia County. Included areas make up about 15 percent of the total acreage.

The Navajo soil is deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is reddish brown clay loam about 4 inches thick. The underlying material to a depth of 60 inches is reddish brown clay. In some areas the soil has less clay below a depth of 40 inches.

Permeability is very slow in the Navajo soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe. This soil is occasionally flooded for very brief periods in summer. Cracks are common in the upper 30 inches. The soil is slightly saline.

The Suwanee soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is reddish brown silty clay loam about 3 inches thick. The underlying material to a depth of 60 inches is dominantly brown and reddish brown silt loam and silty clay loam ranging from 18 to 35 percent in content of clay, but it includes strata of silty clay to loamy fine sand.

Permeability is moderately slow in the Suwanee soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate. This soil is occasionally flooded for very brief periods in summer.

This unit is used for livestock grazing. The potential natural plant community is mainly giant sacaton, alkali sacaton, vine mesquite, and shadscale. The average annual production of air-dry vegetation ranges from 4,000 pounds per acre in favorable years to 800 pounds in unfavorable years. If the plant community deteriorates, giant sacaton and vine mesquite decrease in abundance and galleta, burrograss, mat muhly, and annual forbs and grasses increase. The increasers generally occur in small amounts in the potential natural plant community.

Good grazing management can increase the productivity and reproduction potential of giant sacaton, alkali sacaton, and vine mesquite. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure.

This unit receives runoff from the adjacent areas. As a result, it is potentially more productive. Deterioration of the plant community often results in the formation of gullies that drain the site and hinder the production of vegetation. After gullies have drained the site, a combination of grazing management and engineering practices may be needed to return the site to its productive potential.

This unit is not suitable for such management practices as range seeding because of the low precipitation. The Suwanee soil is limited as a site for livestock ponds because of seepage, but the Navajo soil is suitable as a site for these ponds. Both soils are suited to such management practices as livestock pipelines and fencing.

424—Mespun-Palma association, 1 to 12 percent slopes. This map unit is on stable sand dunes, in interdune areas, and on ridges. Areas are irregular in shape and are 300 to 1,100 acres in size. The native vegetation is mainly grasses and scattered trees and shrubs. Elevation is 5,900 to 7,100 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 45 percent Mespun fine sand, 3 to 12 percent slopes, and 40 percent Palma loamy fine sand, 1 to 7 percent slopes. The Mespun soil is on the upper part of sand dunes and on ridges, and the Palma soil is in interdune areas and on the lower part of stable sand dunes. In areas near the boundary of the soil survey of the eastern part of Valencia County, the soils have a higher content of calcium carbonate and rock fragments.

Included in this unit are small areas of Penistaja and Hagerman soils on fan terraces and between dunes, mainly near the boundary of Bernalillo County; Rock

outcrop on ridges; Zia and Mikim soils on fans; and Aparejo soils on alluvial fans. Included areas make up about 15 percent of the total acreage.

The Mespun soil is deep and excessively drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is yellowish brown fine sand about 2 inches thick. The underlying material to a depth of 60 inches is reddish yellow loamy fine sand and fine sand.

Permeability is rapid in the Mespun soil. Available water capacity is low. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

The Palma soil is deep and well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is light brown loamy fine sand about 4 inches thick. The upper part of the subsoil is brown fine sandy loam about 17 inches thick, and the lower part to a depth of 60 inches is reddish yellow sandy loam.

Permeability is moderately rapid in the Palma soil. Available water capacity is moderate. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for livestock grazing and limited wood products.

The potential natural plant community on the Mespun soil is mainly blue grama, Indian ricegrass, sand dropseed, western wheatgrass, and sand sagebrush. The average annual production of air-dry vegetation ranges from 900 pounds per acre in favorable years to 275 pounds in unfavorable years. If the plant community deteriorates, Indian ricegrass and western wheatgrass decrease in abundance and blue grama and broom snakeweed increase. The increasers generally occur in small amounts in the potential natural plant community.

The potential natural plant community on the Palma soil is mainly blue grama, western wheatgrass, Indian ricegrass, and winterfat. The average annual production of air-dry vegetation ranges from 850 pounds per acre in favorable years to 325 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, Indian ricegrass, needleandthread, and winterfat decrease in abundance and threeawn, galleta, muhly, and broom snakeweed increase. The increasers generally occur in small amounts in the potential natural plant community.

Woody species, such as pinyon and oneseed juniper, may invade on both soils.

This unit is not suitable as a site for livestock ponds because of seepage. Good grazing management can increase the productivity and reproduction potential of Indian ricegrass, western wheatgrass, and winterfat.

Properly managing livestock grazing can protect the unit against excessive soil blowing. Maintaining enough plant residue on the surface can control soil blowing and minimize damage to seedlings.

426—Sheppard-Shiprock association, 1 to 12 percent slopes. This map unit is on old stable dunes, in interdune areas, and on fans. Areas are elongated and are 50 to 1,000 acres in size. The native vegetation is mainly shrubs and grasses. Elevation is 5,400 to 6,000 feet. The average annual precipitation is about 7 to 10 inches, the average annual air temperature is 51 to 55 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 45 percent Sheppard loamy fine sand, 3 to 12 percent slopes, and 35 percent Shiprock sandy loam, 1 to 8 percent slopes. The Sheppard soil is on the upper parts of dunes and on fans, and the Shiprock soil is on the lower parts of dunes, in interdune areas, and on fans.

Included in this unit are small areas of Grieta soils between dunes and on fans, Suwanee and Navajo soils along drainageways, and riverwash in drainageways. Included areas make up about 20 percent of the total acreage.

The Sheppard soil is deep and somewhat excessively drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is reddish yellow loamy fine sand about 4 inches thick. The underlying material to a depth of 60 inches is reddish yellowish loamy fine sand and loamy sand.

Permeability is rapid in the Sheppard soil. Available water capacity is low. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

The Shiprock soil is deep and well drained. It formed in wind-modified, mixed alluvium. Typically, the surface layer is reddish yellow sandy loam about 3 inches thick. The upper part of the subsoil is reddish yellow and reddish brown fine sandy loam about 15 inches thick, and the lower part to a depth of 60 inches is reddish yellow fine sandy loam.

Permeability is moderately rapid in the Shiprock soil. Available water capacity is moderate. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for livestock grazing. The potential natural plant community on the Sheppard soil is mainly black grama, New Mexico feathergrass, Indian ricegrass, and bush muhly. The average annual production of air-dry vegetation ranges from 900 pounds per acre in favorable years to 300 pounds in unfavorable years. If the plant community deteriorates,

black grama and Indian ricegrass decrease in abundance and sandhill muhly, annuals, and cacti increase. The increasers generally occur in small amounts in the potential natural plant community.

The potential natural plant community on the Shiprock soil is mainly black grama, New Mexico feathergrass, Indian ricegrass, and dropseed. The average annual production of air-dry vegetation ranges from 900 pounds per acre in favorable years to 400 pounds in unfavorable years. If the plant community deteriorates, black grama and Indian ricegrass decrease in abundance and ring muhly, sandhill muhly, annuals, and cacti increase. The increasers generally occur in small amounts in the potential natural plant community.

Properly managing livestock grazing can protect the unit against soil blowing. Maintaining enough plant residue on the surface can control soil blowing and minimize damage to seedlings.

This unit is not suitable for livestock ponds or range seeding because of seepage and droughtiness. It is suited to such management practices as livestock pipelines and fencing.

432—Winona-Rock outcrop complex, 3 to 20 percent slopes. This map unit is on benches, hills, ridges, and escarpments. Areas are irregular in shape and are 100 to 2,500 acres in size. The native vegetation is mainly grasses, shrubs, and scattered juniper. Elevation is 6,000 to 6,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 55 percent Winona very gravelly loam, 3 to 20 percent slopes, and 30 percent Rock outcrop. The Winona soil is on ridges, hills, and benches, and the Rock outcrop is on escarpments, hills, and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Harvey soils on hilltops and in depressions, mainly near the boundary of Socorro County, and small areas of Penistaja soils on hills. Included areas make up about 15 percent of the total acreage.

The Winona soil is very shallow or shallow and is well drained. It formed in alluvium and windblown sediments derived dominantly from limestone. Typically, the surface layer is brown very gravelly loam about 3 inches thick. The subsoil is pale brown and very pale brown very cobbly loam about 7 inches thick. Limestone is at a depth of about 10 inches. In some areas the slope is more than 20 percent.

Permeability is moderate in the Winona soil. Available water capacity is very low. The effective rooting depth is 5 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Rock outcrop consists of barren or nearly barren areas of exposed limestone, some of which is very slightly weathered.

This unit is used for livestock grazing. The potential natural plant community on the Winona soil is mainly blue grama, New Mexico feathergrass, sideoats grama, western wheatgrass, little bluestem, and winterfat. The average annual production of air-dry vegetation ranges from 850 pounds per acre in favorable years to 300 pounds in unfavorable years. If the plant community deteriorates, New Mexico feathergrass, sideoats grama, western wheatgrass, and winterfat decrease in abundance and blue grama, bottlebrush squirreltail, and broom snakeweed increase. The increasers generally occur in small amounts in the potential natural plant community.

The Winona soil is not suitable for such management practices as livestock pipelines and range seedling because of the depth to bedrock and the very low available water capacity. Good grazing management can increase the productivity and reproduction potential of New Mexico feathergrass, sideoats grama, and little bluestem.

434—Rizozo-Rock outcrop association, 3 to 55 percent slopes. This map unit is on hills, mesas, escarpments, ridges, and ledges. Areas are irregular in shape and are 100 to 1,100 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 6,000 to 6,700 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 45 percent Rizozo sandy loam, 3 to 55 percent slopes, and 40 percent Rock outcrop. The Rizozo soil is on hills, mesa tops, and ridges, and the Rock outcrop is on hills, ridges, ledges, and escarpments.

Included in this unit are small areas of Penistaja and Oelop soils in depressions and drainageways, Suwanee soils along drainageways, Bond soils on mesa tops and hills, and riverwash along drainageways. Included areas make up about 15 percent of the total acreage.

The Rizozo soil is very shallow or shallow and is well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is reddish brown sandy loam about 2 inches thick. The underlying material is reddish brown sandy loam about 6 inches

thick. Below this is weathered sandstone about 2 inches thick. Unweathered sandstone is at a depth of about 10 inches.

Permeability is moderate in the Rizozo soil. Available water capacity is very low. The effective rooting depth is 4 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

The Rock outcrop consists of barren or nearly barren areas of exposed sandstone on hills, ridges, ledges, and escarpments.

This unit is used for livestock grazing. The potential natural plant community on the Rizozo soil is mainly sideoats grama, blue grama, little bluestem, and oneseed juniper. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 275 pounds in unfavorable years. If the plant community deteriorates, sideoats grama and little bluestem decrease in abundance and blue grama and threeawn increase. The increasers generally occur in small amounts in the potential natural plant community.

The Rizozo soil is not suitable for such management practices as livestock pipelines and range seeding because of the depth to bedrock and the low precipitation. Good grazing management can increase the productivity and reproduction potential of sideoats grama and little bluestem.

446—Harvey-Oelop association, 0 to 5 percent slopes. This map unit is on fan terraces and mesas. Areas are irregular in shape and are 100 to 1,900 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,000 to 6,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 55 percent Harvey loam, 1 to 5 percent slopes, and 30 percent Oelop loam, 0 to 2 percent slopes. The Harvey soil is on mesa tops and fan terraces, and the Oelop soil is in valleys and in drainageways on mesas. In areas near the boundary of the soil survey of the eastern part of Valencia County, the soils have a less well developed subsoil.

Included in this unit are small areas of Penistaja and Hagerman soils on mesas, Winona soils on the tops and sides of mesas, and soils that are similar to the Harvey soil but are very gravelly in the subsoil, are moderately deep, and are on the sides of mesas, mainly near the boundary of Socorro County. Included areas make up about 15 percent of the total acreage.

The Harvey soil is deep and well drained. It formed in alluvium and windblown sediments derived dominantly from limestone. Typically, the surface layer is brown loam about 2 inches thick. The upper part of the subsoil is reddish yellow and light brown clay loam about 18 inches thick, and the lower part to a depth of 60 inches is pink loam.

Permeability is moderate in the Harvey soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Oelop soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is dark yellowish brown loam about 3 inches thick. The upper part of the subsoil is dark yellowish brown clay loam about 13 inches thick, and the lower part to a depth of 60 inches is dark yellowish brown clay loam and loam.

Permeability is moderately slow in the Oelop soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for livestock grazing. The potential natural plant community on the Harvey soil is mainly black grama, sideoats grama, western wheatgrass, and winterfat. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, black grama, western wheatgrass, sideoats grama, and winterfat decrease in abundance and blue grama, broom snakeweed, and cacti increase. The increasers generally occur in small amounts in the potential natural plant community.

Properly managing livestock grazing can protect the Harvey soil against soil blowing and water erosion. Loss of the surface layer results in a severe decrease in productivity and in the potential of the soil to produce plants suitable for grazing. If the plant cover is disturbed, special treatment is needed to control gullying and sheet erosion. Good grazing management can increase the productivity and reproduction potential of western wheatgrass, black grama, and winterfat. This soil is suitable as a site for livestock ponds.

The potential natural plant community on the Oelop soil is mainly western wheatgrass, vine mesquite, alkali sacaton, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 2,000 pounds per acre in favorable years to 900 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, vine mesquite, and fourwing saltbush decrease in abundance and blue grama, galleta, mat muhly, and walkingstick cholla increase. The increasers generally occur in small amounts in the potential natural plant community.

Properly managing livestock grazing can protect the Oelop soil against water erosion. Deterioration of the

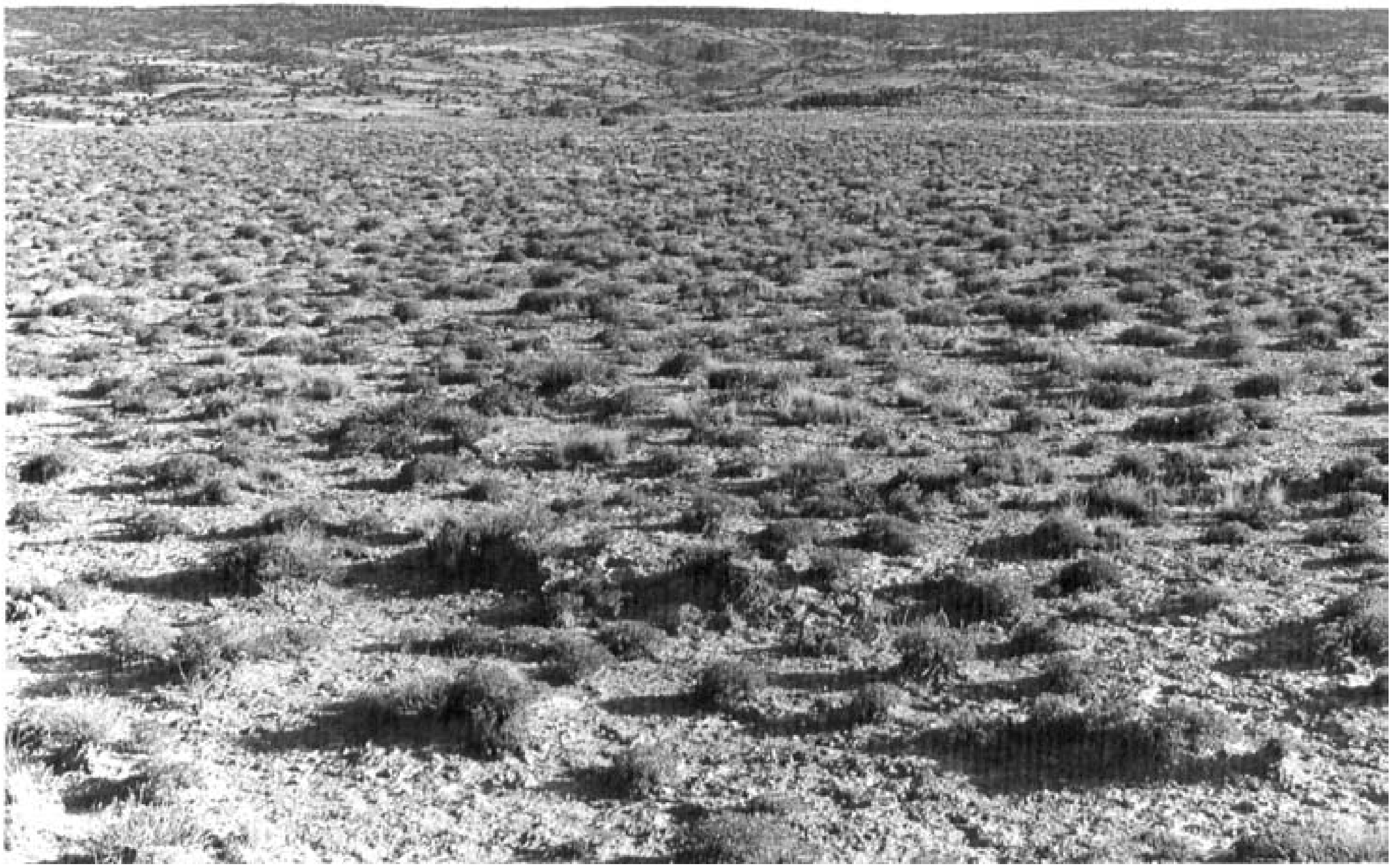


Figure 7.—Typical area of Saido loam, 1 to 12 percent slopes. This is a gypsiferous soil.

plant community often results in the formation of rills and gullies that drain the soil and hinder the production of vegetation. Because of seepage and piping, this soil is not suitable as a site for earthen structures and livestock ponds. Good grazing management can increase the productivity and reproduction potential of western wheatgrass, vine mesquite, and alkali sacaton.

476—Saido loam, 1 to 12 percent slopes. This deep, well drained soil is on fans and knolls. It formed in alluvium derived dominantly from gypsum (fig. 7). Areas are oval or elongated and are 50 to 800 acres in size. The native vegetation is mainly shrubs and forbs. Elevation is 5,500 to 6,400 feet. The average annual precipitation is about 8 to 12 inches, the average annual air temperature is 51 to 53 degrees F, and the average frost-free period is 130 to 150 days.

Typically, the surface layer is reddish brown loam about 2 inches thick. The upper part of the subsoil is white, gypsiferous loam about 9 inches thick, and the lower part to a depth of 60 inches is very pale brown and white loam. In some areas the surface layer is eroded. In areas near the boundary of Socorro County, the soils have a higher content of calcium carbonate and rock fragments.

Included in this unit are small areas of Navajo and Suwanee soils on alluvial fans and flood plains, Netoma soils on fan terraces and valley sides, Sheppard soils on dunes, and soils that are similar to the Netoma soil but are more silty, are shallow or moderately deep over gypsum, and are on plains. Included areas make up about 20 percent of the total acreage.

Permeability is moderate in the Saido soil. Available water capacity also is moderate. The effective rooting

depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe. The soil has more than 40 percent gypsum below a depth of 2 inches.

This unit is used for livestock grazing. The potential natural plant community is mainly alkali sacaton, black grama, blue grama, gyp grama, fourwing saltbush, and winterfat. The average annual production of air-dry vegetation ranges from 800 pounds per acre in favorable years to 350 pounds in unfavorable years. If the plant community deteriorates, black grama and alkali sacaton decrease in abundance and gyp muhly and gray coldenia increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is not suitable as a site for livestock ponds because of the content of gypsum and a potential for piping. Good grazing management can increase the productivity and reproduction potential of black grama and bush muhly.

485—Rock outcrop-Mion complex, 15 to 65 percent slopes. This map unit is on hills, escarpments, and benches. Areas are irregular in shape and are 75 to 2,000 acres in size. The native vegetation is mainly grasses, shrubs, and scattered trees. Elevation is 6,000 to 6,700 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 120 to 160 days.

This unit is 60 percent Rock outcrop and 35 percent Mion stony loam, 15 to 65 percent slopes, extremely stony. The Rock outcrop is on escarpments and benches, and the Mion soil is on hills and benches. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Hagerman and Bond soils and Badland on hills, mainly near the boundary of Socorro County; Penistaja and Harvey soils on the lower hill slopes; Flaco and Berto soils on hills and in the lower areas underlain by basalt; on hills, soils that are similar to the Mion soil but are moderately deep over shale; and Skyvillage soils on ridges, mainly near the boundary of Bernalillo County. Included areas make up about 5 percent of the total acreage.

The Rock outcrop consists barren or nearly barren areas of exposed sandstone, basalt, limestone, or gypsum on steep escarpments and benches.

The Mion soil is shallow and well drained. It formed in alluvium and colluvium derived dominantly from shale and sandstone. Typically, the surface layer is light olive brown stony loam about 3 inches thick. The underlying material is about 10 inches of grayish brown silty clay and silty clay loam. Shale is at a depth of about 13 inches.

Permeability is very slow in the Mion soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is very rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

This unit is used for livestock grazing. The potential natural plant community on the Mion soil is mainly blue grama, sideoats grama, New Mexico feathergrass, black grama, sacahuista, and oneseed juniper. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, black grama and New Mexico feathergrass decrease in abundance and blue grama and threeawn increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is limited as a site for such management practices as livestock pipelines and mechanical brush control because of the depth to bedrock and the slope. Good grazing management can increase the productivity and reproduction potential of black grama and New Mexico feathergrass.

487—Mion-Badland complex, 20 to 65 percent slopes. This map unit is on hills, escarpments, benches, and ridges. Areas are elongated and are 100 to 2,500 acres in size. The native vegetation is mainly grasses, shrubs, and scattered trees. Elevation is 5,800 to 6,500 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 50 to 54 degrees F, and the average frost-free period is 120 to 160 days.

This unit is 50 percent Mion loam, 20 to 65 percent slopes, and 30 percent Badland. The Mion soil is on benches, hills, and ridges, and the Badland is on hills and escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of sandstone, limestone, and gypsum outcrops on benches and escarpments; Winona soils on hills; Skyvillage soils on benches and hills; and soils that are similar to the Mion soil but are moderately deep over shale. Included areas make up about 20 percent of the total acreage.

The Mion soil is shallow and well drained. It formed in alluvium and colluvium derived dominantly from shale. Typically, the surface layer is brown loam about 1 inch thick. The underlying material is about 15 inches of brown and grayish brown clay and silty clay. Shale is at a depth of about 16 inches. In areas near the boundary of Bernalillo County, the soil has less clay. In places it has more sand or gravel.

Permeability is very slow in the Mion soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

The Badland occurs as areas of exposed shale. It supports essentially no vegetation. It commonly is dissected.

This unit is used on a limited basis for livestock grazing. The potential natural plant community is mainly blue grama, sideoats grama, New Mexico feathergrass, black grama, sacahuista, and oneseed juniper. The average annual production of air-dry vegetation ranges from 750 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, black grama and New Mexico feathergrass decrease in abundance and blue grama and threeawn increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is limited as a site for such management practices as livestock pipelines and mechanical brush control because of the depth to rock and the slope. Good grazing management can increase the productivity and reproduction potential of black grama and New Mexico feathergrass.

500—Timhus-Bandera association, 20 to 50 percent slopes. This map unit is on the sides of cinder cones. Areas are oval and are 150 to 400 acres in size. The native vegetation is mainly pinyon, juniper, and ponderosa pine. Elevation is 7,400 to 8,100 feet. The average annual precipitation is about 14 to 20 inches, the average annual air temperature is 40 to 49 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 45 percent Timhus extremely gravelly loam, 20 to 50 percent slopes, and 40 percent Bandera very gravelly loam, 20 to 45 percent slopes. The Timhus soil is on the south-facing side slopes of the cinder cones, and the Bandera soil is on the north-facing side slopes of the cinder cones.

Included in this unit are small areas of Microy soils on the north-facing side slopes of the cinder cones and Cantina and Cabezon soils on the lower parts of hills. Included areas make up about 15 percent of the total acreage.

The Timhus soil is deep and somewhat excessively drained. It formed in colluvial material and windblown volcanic sediments. Typically, the surface layer is yellowish brown extremely gravelly loam about 5 inches thick. The upper part of the subsoil is yellowish brown and light yellowish brown very gravelly loam about 15 inches thick, and the lower part is light yellowish brown extremely gravelly loam about 9 inches thick. Cinders are at a depth of about 29 inches. The depth to cinders ranges from 29 to 60 inches. In some areas the slope is less than 20 percent.

Permeability is moderate in the Timhus soil. Available water capacity is very low. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

The Bandera soil is deep and somewhat excessively drained. It formed in colluvial material and windblown volcanic sediments. Typically, the surface layer is dark brown very gravelly loam about 3 inches thick. The subsurface layer is dark brown gravelly loam about 5 inches thick. The underlying material is dark yellowish brown very gravelly loam about 8 inches thick. Cinders are at a depth of about 16 inches. The depth to cinders ranges from 16 to 60 inches.

Permeability is moderate in the Bandera soil. Available water capacity is very low. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

This unit is used for wood products and livestock grazing.

The site index for pinyon and juniper on the Timhus soil ranges from 25 to 40. Based on a site index of 33, this soil can produce 4 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

The understory vegetation on this unit is mainly blue grama, bottlebrush squirreltail, mountain muhly, and fourwing saltbush. The production of understory can be increased by reducing the density of the canopy. The slope limits access by livestock.

The Bandera soil is suited to the production of ponderosa pine. The site index averages 63 in areas that have slopes of 20 to 35 percent and is 54 to 58 in areas that have slopes of more than 35 percent. Based on a site index of 60, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting ponderosa pine are the hazard of erosion and equipment limitations in the steeper areas, seedling mortality, and plant competition. When timber is harvested, minimizing the risk of erosion is essential. Conventional methods of harvesting can be used in the less sloping areas, but their use is restricted in the steeper areas. Areas that have slopes of more than 35 percent are not suited to conventional harvesting methods. Special design of logging roads, skid trails,

and landings is needed in the steeper areas. Erosion-control structures and seeding can protect the roads against erosion. The seedling mortality rate is moderate because of the low available water capacity.

The understory vegetation on this unit is Arizona fescue, mountain muhly, prairie junegrass, and Gambel oak.

505—Flugle-Goesling loamy fine sands, 1 to 8 percent slopes. This map unit is on fan terraces, hills, mesas, and ridges. Areas are irregular in shape and are 75 to 1,500 acres in size. The native vegetation is mainly grasses, shrubs, and a few scattered trees. Elevation is 6,000 to 6,800 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 53 degrees F, and the average frost-free period is 115 to 135 days.

This unit is 55 percent Flugle loamy fine sand, 1 to 8 percent slopes, and 25 percent Goesling loamy fine sand, 1 to 8 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. In areas near the boundary of Catron County, the soils are moderately deep and slightly drier.

Included in this unit are small areas of Catman and Silkie soils in swales and valleys and Celacy, Atarque, and Quintana soils and Rock outcrop on hills and ridges. Included areas make up about 20 percent of the total acreage.

The Flugle soil is deep and well drained. It formed in wind-modified, mixed alluvium. Typically, the surface layer is brown loamy fine sand about 5 inches thick. The upper part of the subsoil is strong brown and brown sandy clay loam about 22 inches thick, the next part is light brown sandy clay loam about 14 inches thick, and the lower part to a depth of 60 inches is pink sandy loam.

Permeability is moderate in the Flugle soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Goesling soil is deep and well drained. It formed in wind-modified alluvium derived dominantly from sandstone. Typically, the surface layer is light brown loamy fine sand about 5 inches thick. The upper part of the subsoil is brown and light brown sandy clay loam about 13 inches thick. The lower part to a depth of 60 inches is light yellowish brown, very pale brown, and white sandy loam and loam. It has a high content of calcium carbonate in some part.

Permeability is moderately slow in the Goesling soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used for livestock grazing. The potential natural plant community is mainly western wheatgrass, New Mexico feathergrass, galleta, blue grama, and winterfat. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 600 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and New Mexico feathergrass decrease in abundance and blue grama and rabbitbrush increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is suited to such management practices as range seeding, fencing, and livestock pipelines. Good grazing management can increase the productivity and reproduction potential of western wheatgrass.

514—Raton-Rock outcrop complex, 1 to 10 percent slopes. This map unit is in swales on old lava flows, in depressions, and on ridges. Areas are irregular in shape and are 200 to 800 acres in size. The native vegetation is mainly ponderosa pine and an understory of grasses. Elevation is 7,200 to 8,000 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 42 to 45 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 55 percent Raton very cobbly loam, 1 to 10 percent slopes, extremely stony, and 25 percent Rock outcrop. The Raton soil is in swales on old lava flows, in depressions, and on ridgetops, and the Rock outcrop is on ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Charo soils in swales; on ridgetops, soils are that are similar to the Raton soil but are loamy; and, in depressions and swales, soils that are similar to the Raton soil but have a lighter colored surface layer. Included areas make up about 20 percent of the total acreage.

The Raton soil is very shallow or shallow and is well drained. It formed in windblown sediments and alluvium over basalt. Typically, the surface layer is dark reddish brown very cobbly loam about 5 inches thick. The subsoil is reddish brown very cobbly clay about 8 inches thick. Basalt is at a depth of about 13 inches. In most places the soil is covered by layer of pine needles and litter about 1 inch thick.

Permeability is slow in the Raton soil. Available water capacity is very low. The effective rooting depth is 6 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Rock outcrop consists of barren or nearly barren

areas of exposed basalt on the sides of ridges.

This unit is used for wood products and livestock grazing.

The Raton soil is poorly suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 41 to 44. Based on a site index of 40, the potential production of merchantable timber is 1,480 cubic feet, or 3,200 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 30 cubic feet, or 84 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are equipment limitations, seedling mortality, the hazard of windthrow, a slow growth rate, and a low stocking rate. The Rock outcrop restricts the movement of equipment, and sharp, angular cobbles and stones cause abnormal wear of rubber-tired equipment. The seedling mortality rate is high because of the very low available water capacity, the restricted rooting depth, and a high evaporation rate. Trees are subject to windthrow because of the limited rooting depth. A below-normal stocking rate limits yields.

The understory vegetation on this unit is blue grama, little bluestem, sideoats grama, mountain muhly, skunkbush sumac, and Apacheplume. The canopy cover, which ranges from 12 to 22 percent, allows for good production of grasses and forbs.

The average annual production of air-dry understory vegetation ranges from 1,300 pounds per acre in favorable years to 800 pounds in unfavorable years. If the plant community deteriorates, Arizona fescue, little bluestem, and sideoats grama decrease in abundance and threeawn, ring muhly, and broom snakeweed increase. The increasers generally occur in small amounts in the plant community.

This unit is not suitable for such management practices as fencing, livestock ponds, and livestock pipelines because of the depth to bedrock and the Rock outcrop. Constructing trails or walkways can allow livestock to graze in areas where access is limited.

515—Rock outcrop-Vessilla-Mion complex, 3 to 55 percent slopes. This map unit is on escarpments, ridges, and hills. Areas are irregularly shaped and are 120 to 2,000 acres in size. The native vegetation is mainly trees and shrubs. Elevation is 6,500 to 7,400 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 47 to 53 degrees F, and the average frost-free period is 115 to 130 days.

This unit is 45 percent Rock outcrop, 20 percent Vessilla sandy loam, 3 to 55 percent slopes, and 20 percent Mion loam, 3 to 55 percent slopes. The Rock outcrop is on steep escarpments and ridges, the Vessilla soil is on the north-facing slopes of hills and ridges, and the Mion soil is on the south-facing slopes of hills and ridges. In areas near the boundary of Catron County, the soils are more highly developed and have a darker surface layer.

Included in this unit are small areas of Nogal, Celacy, and Galestina soils on hills; soils that are similar to the Mion and Vessilla soils but are moderately deep and are on hills and side slopes; Catman and Silkie soils in valleys; Hickman soils in valleys and on alluvial fans; and Flugle soils on hillsides. Included areas make up about 15 percent of the total acreage.

The Rock outcrop consists of barren or nearly barren areas of sandstone or shale.

The Vessilla soil is shallow or very shallow and is well drained. It formed in eolian and colluvial material derived dominantly from sandstone. Typically, the surface layer is reddish yellow sandy loam about 3 inches thick. The underlying material is light brown sandy loam about 12 inches thick. Sandstone is at a depth of about 15 inches. In some areas the soil is underlain by shale.

Permeability is moderately rapid in the Vessilla soil. Available water capacity is very low. The effective rooting depth is 6 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

The Mion soil is shallow and well drained. It formed in alluvium and colluvium derived dominantly from shale. Typically, the surface layer is brown loam about 2 inches thick. The underlying material is about 9 inches of yellowish brown silty clay and clay. Shale is at a depth of about 11 inches.

Permeability is very slow in the Mion soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

This unit is used for livestock grazing and limited wood products.

The site index for pinyon and juniper is 20 in areas of the Mion soil and 58 in areas of the Vessilla soil. The Mion soil can produce about 2 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot, and the Vessilla soil can produce about 8 cords.

The suitability of this unit for the production of pinyon and juniper is limited because of the slope, the hazard of windthrow, plant competition, and the hazard of erosion. The use of equipment is limited by the Rock outcrop and the slope. Trees are subject to windthrow because of the limited rooting depth. Carefully managing reforestation can minimize competition from

undesirable understory plants. Brushy plants, such as oak, limit the natural regeneration of pinyon and juniper.

Good management is needed to protect the soils against excessive water erosion. Constructing water bars and seeding cut and filled areas can protect logging roads and landings against erosion. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality.

The understory vegetation on this unit is blue grama, Indian ricegrass, western wheatgrass, hairy grama, and forbs. Reducing the density of the canopy can increase the production of understory plants.

518—Borrego-Charo-Rock outcrop complex, 1 to 10 percent slopes. This map unit is on basalt ridges and lava flows and in swales. Areas are irregular in shape and are 200 to 1,000 acres in size. The native vegetation is mainly trees, shrubs, and grasses. Elevation is 7,200 to 7,500 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 40 percent Borrego loam, 2 to 10 percent slopes, very stony; 30 percent Charo loam, 1 to 5 percent slopes; and 15 percent Rock outcrop. The Borrego soil is on basalt ridges, the Charo soil is in swales, and the Rock outcrop is on basalt ridges and lava flows.

Included in this unit are small areas of Hackroy soils on lava flows and ridges and in swales, Cebolleta soils on lava flows and in swales, and Trag soils in swales. Included areas make up about 15 percent of the total acreage.

The Borrego soil is shallow and well drained. It formed in mixed alluvium and windblown sediments over basalt. Typically, the surface layer is brown loam about 3 inches thick. The subsoil is strong brown clay about 8 inches thick. Basalt is at a depth of about 11 inches. In some areas a layer in which calcium carbonate has accumulated is directly above the basalt.

Permeability is very slow in the Borrego soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

The Charo soil is moderately deep and well drained. It formed in mixed alluvium and windblown sediments over basalt. Typically, the upper part of the surface layer is brown loam about 2 inches thick. The lower part is brown clay loam about 4 inches thick. The subsoil is brown clay about 21 inches thick. Basalt is at a depth of about 27 inches. In some areas a layer in which calcium carbonate has accumulated is directly above the basalt.

Permeability is slow in the Charo soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt on lava flows and ridges.

This unit is used for livestock grazing and wood products.

The site index for ponderosa pine on the Borrego soil ranges from 52 to 58. Based on a site index of 55, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber on the Borrego soil are equipment limitations, seeding mortality, and the hazard of windthrow. Stones on the surface can interfere with felling, yarding, and other activities involving the use of equipment. The seedling mortality rate is high because of the very low available water capacity and the clayey texture. The understory vegetation is gray horsebrush, Arizona fescue, blue grama, and mountain muhly.

The potential natural plant community on the Charo soil is mainly mountain muhly, Arizona fescue, muttongrass, western wheatgrass, and prairie junegrass. The average annual production of air-dry vegetation ranges from 1,050 pounds per acre in favorable years to 650 pounds in unfavorable years. If the plant community deteriorates, mountain muhly, western wheatgrass, and prairie junegrass decrease in abundance and Stipa and blue grama increase. The increasers generally occur in small amounts in the potential natural plant community.

The Charo soil is suited to such management practices as range seeding and livestock pipelines. It is not suitable as a site for livestock ponds because of the depth to bedrock.

520—Celacy-Atarque complex, 1 to 10 percent slopes. This map unit is on mesa tops, cuestas, and hilltops. Areas are irregular in shape and are 50 to 2,500 acres in size. The native vegetation is mainly grasses and some scattered trees. Elevation is 6,600 to 7,300 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 115 to 130 days.

This unit is 55 percent Celacy sandy loam, 1 to 5

percent slopes, and 30 percent Atarque fine sandy loam, 2 to 10 percent slopes. The Celacy soil is on mesa tops and the lower dip slopes of cuestas, and the Atarque soil is on mesa tops, the upper dip slopes of cuestas, and hilltops. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Flugle and Goesling soils in valleys between hills and on mesa tops, Catman soils in depressions and drainageways, and Rock outcrop on ledges, escarpments, and hilltops. Included areas make up about 15 percent of the total acreage.

The Celacy soil is moderately deep and well drained. It formed in alluvium and eolian material derived dominantly from sandstone. Typically, the surface layer is strong brown sandy loam about 2 inches thick. The upper part of the subsoil is strong brown sandy clay loam about 10 inches thick, and the lower part is reddish yellow sandy clay loam about 12 inches thick. Sandstone is at a depth of about 24 inches.

Permeability is moderate in the Celacy soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Atarque soil is shallow or very shallow and is well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 2 inches thick. The subsoil is brown sandy clay loam about 14 inches thick. Sandstone is at a depth of about 16 inches.

Permeability is moderate in the Atarque soil. Available water capacity is very low. The effective rooting depth is 8 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing and fuel wood production.

The potential natural plant community on the Celacy soil is mainly blue grama, western wheatgrass, pinyon, and oneseed juniper. The average annual production of air-dry vegetation ranges from 875 pounds per acre in favorable years to 300 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, Indian ricegrass, pinyon ricegrass, and prairie junegrass decrease in abundance and blue grama, threeawn, pinyon, and oneseed juniper increase. The increasers generally occur in small amounts in the potential natural plant community.

The potential natural plant community on the Atarque soil is mainly sideoats grama, New Mexico feathergrass, Indian ricegrass, blue grama, and scattered oneseed juniper. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 275 pounds in unfavorable years. If the plant community deteriorates, sideoats grama, New Mexico feathergrass, and Indian ricegrass decrease in abundance and blue grama, sand sagebrush, broom snakeweed, and oneseed juniper increase. The increasers generally occur in small amounts in the potential natural plant community.

The site index for pinyon and juniper on the Celacy and Atarque soils ranges from 13 to 16. Based on a site index of 15, the soils can produce about 2 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

The soils are suited to such management practices as range seeding. In some areas dense stands of pinyon and juniper may become established. If properly managed, a limited wood crop can be produced in these areas. Reducing the density of the canopy can increase the production of understory grasses.

522—Bandera association, 15 to 45 percent slopes. This map unit is on cinder cones and hills. Areas are irregular in shape and are 50 to 600 acres in size. The native vegetation is mainly ponderosa pine and a sparse understory of grasses. Elevation is 7,800 to 8,300 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 50 percent Bandera gravelly loam, 30 to 45 percent slopes, and 30 percent Bandera gravelly loam, 15 to 30 percent slopes. The steeper Bandera soil is on cinder cones and the upper hillsides, and the less sloping Bandera soil is on the lower hills.

Included in this unit are small areas of Raton soils on ridges, Charo soils on hills and ridges, and Rock outcrop on hilltops and ridges. Included areas make up about 20 percent of the total acreage.

The steeper Bandera soil is deep and somewhat excessively drained. It formed in colluvium and windblown sediments derived dominantly from cinders. Typically, the surface layer is brown gravelly loam about 3 inches thick. The subsurface layer is dark brown gravelly loam about 5 inches thick. The underlying material is dark yellowish brown very gravelly loam about 10 inches thick. Cinders are at a depth of about 18 inches. A thin layer of undecomposed pine needles covers the surface in some areas.

Permeability is moderate in the steeper Bandera soil. Available water capacity is very low. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The less sloping Bandera soil is deep and somewhat

excessively drained. It formed in colluvium and windblown sediments derived dominantly from cinders. Typically, the surface layer is brown gravelly loam about 4 inches thick. The subsurface layer is brown gravelly loam about 5 inches thick. The underlying material is yellowish brown very gravelly loam about 7 inches thick. Unconsolidated cinders are at a depth of about 16 inches.

Permeability is moderate in the less sloping Bandera soil. Available water capacity is very low. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used for livestock grazing and wood products.

This unit is suited to the production of ponderosa pine. The site index for ponderosa pine averages 63 in the less sloping areas and is 54 to 58 in the steeper areas. Based on a site index of 60, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting ponderosa pine are the hazard of erosion and equipment limitations in the steeper areas, seedling mortality, and plant competition. Conventional methods of harvesting can be used in the less sloping areas, but their use is limited in the steeper areas. Areas that have slopes of more than 30 percent are not suited to conventional methods of harvesting. Special design of logging roads, skid trails, and landings is needed in the steeper areas. Erosion-control structures and seeding can protect the roads against erosion. The seedling mortality rate is moderate because of the large number of pebbles. Brushy plants, such as Gambel oak, and grasses, such as Arizona fescue and mountain muhly, limit the natural regeneration of ponderosa pine, but they do not prevent the eventual development of a fully stocked, normal stand of trees.

The understory vegetation on this unit is Arizona fescue, mountain muhly, prairie junegrass, Fendler ceanothus, and Gambel oak.

523—Charo-Raton complex, 1 to 10 percent slopes. This map unit is on basalt plains and basalt ridges and in depressions. Areas are irregular in shape and are 200 to 1,200 acres in size. The native vegetation is mainly ponderosa pine, grasses, and shrubs. Elevation is 7,500 to 8,000 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 42 to 45 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 45 percent Charo cobbly loam, 1 to 5 percent slopes, and 40 percent Raton very cobbly loam, 2 to 10 percent slopes, very stony. The Charo soil is in swales on basalt plains, and the Raton soil is on basalt ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Rock outcrop on lava ridges, soils that are similar to the Raton soil but have less than 35 percent rock fragments in the subsoil and are on lava ridges, and soils that are similar to the Charo soil but are deep to basalt and are in pockets. Included areas make up about 15 percent of the total acreage.

The Charo soil is moderately deep and well drained. It formed in mixed alluvium and windblown sediments over basalt. Typically, the surface layer is brown cobbly loam about 2 inches thick. The next layer is brown clay loam about 6 inches thick. The subsoil is brown and strong brown clay about 20 inches thick. Basalt is at a depth of about 28 inches.

Permeability is slow in the Charo soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

The Raton soil is shallow and well drained. It formed in alluvium and windblown sediments over basalt. Typically, the surface layer is dark grayish brown very cobbly loam about 2 inches thick. The subsurface layer also is dark grayish brown very cobbly loam. It is about 5 inches thick. The subsoil is brown and strong brown very cobbly clay about 11 inches thick. Basalt is at a depth of about 18 inches. In some areas a layer of pine needle litter about 1 inch thick is on the surface.

Permeability is slow in the Raton soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for wood products and livestock grazing.

This unit is suited to the production of ponderosa pine. The site index for ponderosa pine is 54 to 59 on the Raton soil and averages 66 on the Charo soil. Based on a site index of 60, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber on the Raton soil are equipment limitations,

seedling mortality, and the hazard of windthrow. Stones on the surface can interfere with felling, yarding, and other activities involving the use of equipment. The seedling mortality rate is moderate because of the very low available water capacity and the high content of clay. Trees are subject to windthrow because of the limited rooting depth.

The main concerns in producing and harvesting timber on the Charo soil are equipment limitations and plant competition. Conventional methods of harvesting timber generally can be used, but their use may be limited when the soil is wet. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Brushy plants, such as Gambel oak and Fendler ceanothus, limit the natural regeneration of ponderosa pine. Trees commonly are subject to windthrow during periods when the soil is excessively wet and winds are strong.

The understory vegetation on this unit is Gambel oak, Fendler ceanothus, gray horsebrush, Arizona fescue, mountain muhly, and blue grama.

525—Catman-Silkie association, 1 to 10 percent slopes. This map unit is in valleys and on fans. Areas are irregular in shape and are 100 to 2,000 acres in size. The native vegetation is mainly grasses, forbs, and shrubs. Elevation is 6,600 to 7,500 feet. The average annual precipitation is about 13 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

This unit is 45 percent Catman clay loam, 1 to 5 percent slopes, and 40 percent Silkie clay loam, 3 to 10 percent slopes. The Catman soil is on valley bottoms, alluvial fans, and the lower valley sides, and the Silkie soil is on the upper valley sides.

Included in this unit are small areas of Hickman soils on valley sides and fans, Flugle and Goesling soils on valley sides, and sandstone and shale outcrops on the upper valley sides. Included areas make up about 15 percent of the total acreage.

The Catman soil is deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is light olive brown clay loam about 3 inches thick. The underlying material to a depth of 60 inches is light olive brown clay. In some areas cracks are in the upper 20 inches when the soil is dry.

Permeability is very slow in the Catman soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight. This soil is slightly saline. It is occasionally flooded for long periods in summer.

The Silkie soil is deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is light yellowish brown clay loam about 4 inches thick. The subsoil to a depth of 60 inches is light olive brown clay.

Permeability is very slow in the Silkie soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing. The potential natural plant community on the Catman soil is mainly western wheatgrass, vine mesquite, spike muhly, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 3,200 pounds per acre in favorable years to 1,250 pounds in unfavorable years. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive. If the plant community deteriorates, western wheatgrass, spike muhly, and winterfat decrease in abundance and blue grama, annual grasses and forbs, rabbitbrush, and broom snakeweed increase. The increasers generally occur in small amounts in the potential natural plant community.

The potential natural plant community on the Silkie soil is mainly alkali sacaton, spike muhly, western wheatgrass, bottlebrush squirreltail, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 800 pounds per acre in favorable years to 300 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, spike muhly, and alkali sacaton decrease in abundance and blue grama, cacti, broom snakeweed, and rabbitbrush increase. The increasers generally occur in small amounts in the potential natural plant community.

Deterioration of the plant community on this unit often results in the formation of very deep, vertical-walled gullies that drain the site and hinder the production of vegetation. After the gullies have drained the site, a combination of grazing management and engineering practices may be needed to return the site to its productive potential.

This unit is suited to such management practices as livestock ponds, fencing, and livestock pipelines.

535—Millpaw loam, 0 to 5 percent slopes. This deep, well drained soil is in swales and valleys. It formed in mixed alluvium. Areas are irregular in shape and are 100 to 1,500 acres in size. The native vegetation is mainly grasses. Elevation is 7,000 to 7,800 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is brown loam about 3

inches thick. The upper 26 inches of the subsoil is dark brown clay loam and clay, and the lower part to a depth of 60 inches is brown and brownish yellow sandy clay loam. In areas near the boundary of Catron County, temperatures are slightly cooler and the soil has a thinner surface layer and a higher content of calcium carbonate.

Included in this unit are small areas of Catman soils on valley bottoms and in depressions, Montecito soils on valley sides and bottoms, and Flugle, Galestina, and Pinitos soils on valley sides. Included areas make up about 15 percent of the total acreage.

Permeability is slow in the Millpaw soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing and some dryland farming.

The potential natural plant community on this unit is mainly western wheatgrass, New Mexico feathergrass, galleta, blue grama, and winterfat. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 600 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and New Mexico feathergrass decrease in abundance and blue grama and rabbitbrush increase. The increasers generally occur in small amounts in the potential natural plant community.

This unit is suited to such management practices as range seeding, fencing, livestock ponds, and livestock pipelines. Good grazing management can increase the productivity and reproduction potential of western wheatgrass.

If this unit is used for nonirrigated crops, the main limitation is the low precipitation.

536—McGaffey loam, 1 to 5 percent slopes. This deep, well drained soil is on fan terraces and valley floors. It formed in mixed alluvium. Areas are irregular in shape and are 100 to 600 acres in size. The native vegetation is mainly grasses and trees. Elevation is 7,500 to 8,500 feet. The average annual precipitation is about 18 to 22 inches, the average annual air temperature is 40 to 44 degrees F, and the average frost-free period is 90 to 105 days.

Typically, the surface layer is reddish brown loam about 3 inches thick. The subsoil is about 30 inches of reddish brown loam and clay loam. The substratum to a depth of 60 inches is reddish brown and reddish yellow loam and clay loam.

Included in this unit are small areas of Charo soils on mesas, Moreno soils on fan terraces, and Raton soils on lava ridges. Included areas make up about 20 percent of the total acreage.

Permeability is moderate in the McGaffey soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

This unit is used for livestock grazing (fig. 8) and wood products.

This unit is well suited to the production of ponderosa pine. The site index ranges from 83 to 93. Based on a site index of 90, the potential production of merchantable timber is 6,700 cubic feet, or 40,300 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 85 cubic feet, or 403 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of erosion and plant competition. When timber is harvested, minimizing the risk of water erosion is essential. Constructing water bars and seeding cut and filled areas can protect logging roads and landings against erosion. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality. Grasses, forbs, and shrubs limit the natural regeneration of ponderosa pine. Properly preparing the site can control competing vegetation.

The understory vegetation on this unit is Arizona fescue, mountain muhly, and western wheatgrass.

537—Millpaw-Loarc complex, 0 to 10 percent slopes. This map unit is on fan terraces, in swales, and on mesa tops and hills. Areas are irregular in shape and are 100 to 1,500 acres in size. The native vegetation is mainly pinyon and oneseed juniper and an understory of grasses. Elevation is 7,200 to 7,800 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

This unit is 50 percent Millpaw loam, 0 to 5 percent slopes, and 35 percent Loarc fine sandy loam, 0 to 10 percent slopes. The Millpaw soil is in swales and on mesa tops, and the Loarc soil is on mesa tops, fan terraces, and hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. In areas near the boundary of Catron County, temperatures are slightly cooler and the soils have a thinner surface layer and a higher content of calcium carbonate.

Included in this unit are small areas of Pinitos and

Figure 8.—An area of McGaffey loam, 1 to 5 percent slopes, used for livestock grazing.

Ribera soils on fan terraces and mesa tops, Galestina soils on fan terraces and hills, Catman soils in depressions, and Cabezon soils on hills. Included areas make up about 15 percent of the total acreage.

The Millpaw soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown loam about 2 inches thick. The upper part of the subsoil is brown and strong brown sandy clay about 35 inches thick, and the lower part to a depth of 60 inches is strong brown sandy clay and sandy clay loam.

Permeability is slow in the Millpaw soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Loarc soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown fine sandy loam about 4 inches thick. The upper part of the subsoil is brown and dark yellowish brown sandy clay loam about 27 inches thick, and the lower part to a depth of 60 inches is yellowish brown sandy clay loam.

Permeability is moderate in the Loarc soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wood products.

The site index for pinyon and juniper on this unit ranges from 40 to 52. Based on a site index of 46, the

unit can produce about 7 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

The understory vegetation on this unit is blue grama, bottlebrush squirreltail, pinyon ricegrass, and rabbitbrush.

540—Montecito fine sandy loam, 1 to 15 percent slopes. This deep, well drained soil is on mesas and ridges. It formed in mixed alluvium and windblown sediments. Areas are irregular in shape and are 200 to 2,000 acres in size. The native vegetation is mainly pinyon, juniper, and grasses. Elevation is 6,800 to 7,300 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 100 to 120 days.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The upper part of the subsoil is brown and strong brown clay about 25 inches thick, and the lower part to a depth of 60 inches is pink gravelly clay loam. In some areas on Santa Rita Mesa, near Fence Lake, the soil has indurated caliche at a depth of less than 40 inches.

Included in this unit are small areas of Millpaw soils in depressions, Pinitos and Ribera soils on mesas and ridges, and Loarc soils on mesas. Included areas make up about 25 percent of the total acreage.

Permeability is moderately slow in the Montecito soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for wood products and livestock grazing.

The site index for pinyon and juniper on this unit ranges from 25 to 35. Based on a site index of 30, the unit can produce about 3 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

The understory vegetation on this unit is blue grama, muttongrass, western wheatgrass, spineless horsebrush, and fringed sagebrush.

550—Nogal-Galestina sandy loams, 1 to 10 percent slopes. This map unit is on mesa tops and hills. Areas are irregular in shape and are 100 to 2,500 acres in size. The native vegetation is mainly grasses, pinyon, and scattered juniper. Elevation is 6,800 to 7,500 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

This unit is 45 percent Nogal sandy loam, 1 to 10 percent slopes, and 35 percent Galestina sandy loam, 1 to 8 percent slopes. Both soils are on mesa tops and hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. The soils in areas near the boundary of Catron County have a higher content of calcium carbonate and are drier in the subsoil. Those in areas near the boundary of Socorro County have a less well developed subsoil.

Included in this unit are small areas of Rock outcrop on hills, ridges, and escarpments; Silkie soils on valley sides; shallow, fine textured soils on hills; and Pinitos and Ribera soils on mesa tops. Included areas make up about 20 percent of the total acreage.

The Nogal soil is moderately deep and well drained. It formed in alluvium derived dominantly from interbedded sandstone and shale. Typically, the surface layer is brown sandy loam about 1 inch thick. The upper 18 inches of the subsoil is brown clay loam and clay, and the lower 12 inches is strong brown clay. Hard, interbedded sandstone and shale are at a depth of about 31 inches.

Permeability is slow in the Nogal soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Galestina soil is deep and well drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is yellowish brown sandy loam about 2 inches thick. The subsurface layer is yellowish brown loam about 5 inches thick. The upper part of the subsoil is yellowish brown clay about 24 inches thick, and the lower part is yellowish brown and light yellowish brown clay about 15 inches thick. Shale is at a depth of about 46 inches.

Permeability is slow in the Galestina soil. Available water capacity is moderate. The effective rooting depth is 40 to 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wood products.

The site index for pinyon and juniper on the Nogal soil ranges from 21 to 50. Based on a site index of 35, the soil can produce about 6 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The suitability for the production of pinyon and juniper is limited because of the medium runoff and the low available water capacity.

The understory vegetation on the Nogal soil is western wheatgrass, blue grama, prairie junegrass,

Gambel oak, and forbs. Reducing the density of the canopy can increase the production of understory plants.

The potential natural plant community on the Galestina soil is mainly western wheatgrass, New Mexico feathergrass, sideoats grama, and winterfat. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, New Mexico feathergrass, sideoats grama, and winterfat decrease in abundance and blue grama, galleta, and cactus increase. The increasers generally occur in small amounts in the potential natural plant community.

Good grazing management can increase the productivity and reproduction potential of cool-season grasses. If the plant cover is disturbed, special treatment is needed to control gullying and sheet erosion.

555—Pinitos-Ribera sandy loams, 1 to 10 percent slopes. This map unit is on mesa tops and gently rolling hills. Areas are irregular in shape and are 150 to 2,000 acres in size. The native vegetation is mainly grasses, pinyon, and scattered juniper and ponderosa pine. Elevation is 6,800 to 7,500 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

This unit is 50 percent Pinitos sandy loam and 30 percent Ribera sandy loam. Both soils are on mesa tops and hills. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. The soils in areas near the boundary of Catron County have a higher content of clay in the subsoil. Those in areas near the boundary of Socorro County are less well developed and are shallower.

Included in this unit are small areas of Galestina and Nogal soils between hills and in depressions; Rock outcrop on hilltops, ridges, ledges, and escarpments; soils that are similar to the Ribera soil but are shallow and are on hilltops and ridgetops; and Catman soils along drainageways. Included areas make up about 20 percent of the total acreage.

The Pinitos soil is deep and well drained. It formed in wind-modified alluvium derived dominantly from sandstone. Typically, the surface layer is light brown sandy loam about 2 inches thick. The upper part of the subsoil is brown and light brown sandy clay loam about 22 inches thick, and the lower part to a depth of 60 inches is light brown sandy loam.

Permeability is moderate in the Pinitos soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Ribera soil is moderately deep and well drained. It formed in wind-modified alluvium derived dominantly from sandstone. Typically, the surface layer is brown sandy loam about 3 inches thick. The upper 13 inches of the subsoil is brown and yellowish brown sandy clay loam, and the lower 23 inches is yellowish brown and brown sandy clay loam and clay loam. Sandstone is at a depth of about 39 inches.

Permeability is moderate in the Ribera soil. Available water capacity also is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used for livestock grazing and wood products.

The site index for pinyon and juniper on this unit ranges from 40 to 50. Based on a site index of 45, the unit can produce about 7 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

The understory vegetation on this unit is western wheatgrass, blue grama, big sagebrush, bottlebrush squirreltail, and pinyon ricegrass. Reducing the density of the canopy can increase the production of understory plants.

560—Flugle-Teco association, 1 to 8 percent slopes. This map unit is on mesas and ridges and in swales. Areas are irregular in shape and are 500 to 6,000 acres in size. The native vegetation is mainly grasses and trees. Elevation is 6,600 to 7,000 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 115 to 135 days.

This unit is 50 percent Flugle loamy fine sand, 3 to 8 percent slopes, and 30 percent Teco sandy loam, 1 to 4 percent slopes. The Flugle soil is on ridges and mesas, and the Teco soil is on ridges and mesas and in swales. The soils in areas near the boundary of Apache County, Arizona, have a lower content of clay in the subsoil. Those in areas near the boundary of Catron County are moderately deep over bedrock.

Included in this unit are small areas of Hickman and Catman soils along drainageways and in swales; on ridges and hills, soils that are similar to the Flugle soil but have less than 18 percent clay; and Goesling and Quintana soils on ridges. Included areas make up about 20 percent of the total acreage.

The Flugle soil is deep and well drained. It formed in wind-modified, mixed alluvium. Typically, the surface layer is brown loamy fine sand about 3 inches thick.

The subsurface layer is brown fine sandy loam about 2 inches thick. The upper 16 inches of the subsoil is reddish brown clay loam and sandy clay, the upper part of the subsoil is dark brown sandy clay loam about 14 inches thick, the next part is light brown and brown sandy clay loam about 18 inches thick, and the lower part to a depth of 60 inches is sandy loam.

Permeability is moderate in the Flugle soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Teco soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown sandy loam about 2 inches thick. The upper 16 inches of the subsoil is reddish brown clay loam and sandy clay, the next 25 inches is light reddish brown sandy clay loam, and the lower part to a depth of 60 inches is light reddish brown sandy loam.

Permeability is moderately slow in the Teco soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

This unit is used for livestock grazing and wood products.

The site index for pinyon and juniper on the Flugle soil ranges from 30 to 50. Based on a site index of 40, the soil can produce about 6 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. Properly managing the soil helps to control soil blowing.

The understory vegetation on the Flugle soil is pinyon ricegrass, Indian ricegrass, blue grama, and bottlebrush squirreltail. Reducing the density of the canopy can increase the production of understory plants.

The potential natural plant community on the Teco soil is mainly western wheatgrass, alkali sacaton, galleta, and winterfat. The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 600 pounds in unfavorable years. The soil is suited to such management practices as livestock pipelines, range seeding, and brush control. Good grazing management can increase the productivity and reproduction potential of western wheatgrass and alkali sacaton.

561—Flugle-Quintana complex, 2 to 15 percent slopes. This map unit is on ridges and hills and in dissected valleys. Areas are elongated and are 150 to 1,200 acres in size. The native vegetation is mainly grasses and trees. Elevation is 6,400 to 6,900 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 115 to 130 days.

This unit is 45 percent Flugle sandy loam, 2 to 8 percent slopes, and 35 percent Quintana fine sandy loam, 5 to 15 percent slopes. The Flugle soil is on hills and ridges, and the Quintana soil is on ridges and in dissected valleys. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. The soils in areas near the boundary of Apache County, Arizona, have a higher content of calcium carbonate. Those in areas near the boundary of Catron County are moderately deep and fine textured and have a higher content of calcium carbonate.

Included in this unit are small areas of Goesling soils on mesas and Teco soils on mesa tops and in swales. Also included are Atarque soils on ridges and in gullied areas. Included areas make up about 20 percent of the total acreage.

The Flugle soil is deep and well drained. It formed in wind-modified, mixed alluvium. Typically, the surface layer is brown sandy loam about 2 inches thick. The upper 17 inches of the subsoil is brown and reddish brown sandy clay loam, the next 28 inches is light brown sandy clay loam and clay loam, and the lower part to a depth of 60 inches is light brown sandy loam.

Permeability is moderate in the Flugle soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Quintana soil is deep and well drained. It formed in mixed alluvium reworked by the wind. Typically, the surface layer is light brown fine sandy loam about 2 inches thick. The upper 9 inches of the subsoil is brown fine sandy loam, the next 35 inches is pink loam and sandy clay loam, and the lower part to a depth of 60 inches is pink sandy loam. In some areas the slope is more than 15 percent.

Permeability is moderate in the Quintana soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is severe. The hazard of soil blowing is slight.

This unit is used for livestock grazing and wood products.

The site index for pinyon and juniper on this unit ranges from 30 to 50. Based on a site index of 40, the unit can produce 6 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. Good management is needed to protect the unit against excessive soil blowing and water erosion.

The understory vegetation on this unit is pinyon ricegrass, Indian ricegrass, blue grama, and bottlebrush

squirreltail. Reducing the density of the canopy can increase the production of understory plants.

565—Quintana sandy loam, 5 to 15 percent slopes, gullied. This deep, well drained soil is on dissected ridges and terrace escarpments. It formed in wind-modified, mixed alluvium. Areas are irregular in shape and are 200 to 1,500 acres in size. The native vegetation is mainly trees and grasses. Elevation is 6,400 to 6,900 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 115 to 130 days.

Typically, the surface layer is brown sandy loam about 4 inches thick. The upper part of the subsoil is strong brown and light brown sandy clay loam about 17 inches thick, and the lower part to a depth of 60 inches is pink and light brown sandy loam.

Included in this unit are small areas of Goesling and Flugle soils on mesas and side slopes, Teco soils in swales and valleys, and gullied land. Included areas make up about 20 percent of the total acreage.

Permeability is moderate in the Quintana soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing is slight.

This unit is used for limited livestock grazing and fuel wood production.

The site index for pinyon and juniper on this unit ranges from 32 to 38. Based on a site index of 35, the unit can produce 4 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

The understory vegetation on this unit is antelope bitterbrush and Indian ricegrass.

570—Torreon-Rock outcrop-Cabezon complex, 15 to 45 percent slopes. This map unit is on hills, ridges, and escarpments. Areas are irregular in shape and are 100 to 1,250 acres in size. The native vegetation is mainly grasses, shrubs, and trees. Elevation is 6,400 to 7,800 feet. The average annual precipitation is about 12 to 16 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 100 to 135 days.

This unit is 40 percent Torreon very cobbly loam, 15 to 35 percent slopes, extremely stony; 25 percent Rock outcrop; and 15 percent Cabezon very cobbly loam, 15 to 45 percent slopes. The Torreon and Cabezon soils are on hills and ridges, and the Rock outcrop is on escarpments, hills, and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. Areas near the boundary of Catron County are cooler.

Included in this unit are small areas of Atarque soils on mesa breaks; Flugle, Celacy, Ribera, and Pinitos soils on hills and ridges; and Catman and Hickman soils along narrow drainageways. Included areas make up about 20 percent of the total acreage.

The Torreon soil is deep and well drained. It formed in mixed colluvium and alluvium. Typically, the surface layer is brown very cobbly loam about 2 inches thick. The upper 23 inches of the subsoil is brown and reddish brown clay loam and clay, and the lower 35 inches is pinkish white silty clay loam. In some areas the soil is moderately deep or has less clay or more gravel.

Permeability is slow in the Torreon soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt on escarpments, ledges, and ridges.

The Cabezon soil is shallow and well drained. It formed in windblown sediments and alluvium. Typically, the surface layer is brown very cobbly loam about 3 inches thick. The subsoil is brown and dark brown clay loam about 10 inches thick. Basalt is at a depth of about 13 inches.

Permeability is slow in the Cabezon soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing, wildlife habitat, and wood products.

The site index for pinyon and juniper on the Torreon and Cabezon soils ranges from 38 to 55. Based on a site index of 46, the soils can produce 6 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

The understory vegetation on this unit is blue grama, bottlebrush squirreltail, and pinyon ricegrass. Reducing the density of the canopy can increase the production of understory plants. The main limitations affecting the use of this unit for livestock grazing are stones on the surface and the slope.

575—Teco-Atarque association, 1 to 8 percent slopes. This map unit is on old basalt-capped mesas. The soils formed in mixed alluvium reworked by the wind. Areas are elongated and are 200 to 2,000 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 6,600 to 7,000 feet. The

average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 115 to 135 days.

This unit is 60 percent Teco fine sandy loam, 1 to 4 percent slopes, and 25 percent Atarque fine sandy loam, 1 to 8 percent slopes. The Teco soil is in swales and in low areas on basalt-capped mesas, and the Atarque soil is on knolls in high areas on basalt-capped mesas. The soils in areas near the boundary of Apache County, Arizona, have less clay in the subsoil.

Included in this unit are small areas of Flugle and Goesling soils on mesas, Rock outcrop on knolls, soils that are similar to the Atarque soil but are fine textured and are on knolls, and soils that are similar to the Teco soil but are moderately deep and are on mesas and the lower parts of knolls. Included areas make up about 15 percent of the total acreage.

The Teco soil is deep and well drained. It formed in alluvium and eolian material derived dominantly from sandstone and shale. Typically, the surface layer and subsurface layer are light brown fine sandy loam. The surface layer is about 4 inches thick, and the subsurface layer is about 2 inches thick. The upper 18 inches of the subsoil is reddish brown and brown clay loam, the next 17 inches is light brown and pink clay loam and sandy clay loam, and the lower part to a depth of 60 inches is reddish yellow gravelly sandy loam.

Permeability is moderately slow in the Teco soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing also is slight.

The Atarque soil is shallow or very shallow and is well drained. It formed in wind-modified, mixed alluvium. Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsoil is brown and light brown clay loam about 16 inches thick. Basalt is at a depth of about 19 inches.

Permeability is moderate in the Atarque soil. Available water capacity is very low. The effective rooting depth is 8 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

This unit is used for livestock grazing. The potential natural plant community on the Teco soil is mainly alkali sacaton, western wheatgrass, galleta, and winterfat. The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 600 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, alkali sacaton, and winterfat decrease in abundance and muhly, dropseed, and rabbitbrush increase. The increasers normally occur in small amounts in the potential natural plant community.

The Teco soil is suited to such management practices as livestock pipelines and range seeding. Good grazing management can increase the productivity and reproduction potential of western wheatgrass and alkali sacaton. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive.

The potential natural plant community on the Atarque soil is mainly blue grama, sideoats grama, black grama, little bluestem, and wolftail. The average annual production of air-dry vegetation ranges from 1,100 pounds per acre in favorable years to 425 pounds in unfavorable years. If the plant community deteriorates, sideoats grama, black grama, and little bluestem decrease in abundance and blue grama and wolftail increase. The increasers normally occur in small amounts in the potential natural plant community.

The Atarque soil is not suitable as a site for as livestock pipelines and livestock ponds because of the depth to bedrock. Good grazing management can increase the productivity and reproduction potential of sideoats grama, black grama, and little bluestem.

576—Teco sandy loam, 2 to 5 percent slopes. This deep, well drained soil is on valley sides and hills. It formed in mixed alluvium. Areas are irregular in shape and are 100 to 600 acres in size. The native vegetation is mainly grasses. Elevation is 6,800 to 7,500 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 115 to 135 days.

Typically, the surface layer is light brown sandy loam about 3 inches thick. The upper part of the subsoil is reddish brown sandy clay about 25 inches thick, and the lower part to a depth of 60 inches is reddish yellow sandy clay.

Included in this unit are small areas of Atarque soils on hilltops, Catman and Venadito soils on valley bottoms, Silkie soils on fans, and Flugle soils on hillsides. Included areas make up about 20 percent of the total acreage.

Permeability is moderately slow in the Teco soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing. The potential natural plant community is mainly alkali sacaton, western wheatgrass, galleta, and winterfat. The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 600 pounds

in unfavorable years. If the plant community deteriorates, western wheatgrass, alkali sacaton, and winterfat decrease in abundance and muhly, dropseed, and rabbitbrush increase. The increasers normally occur in small amounts in the potential natural plant community.

This unit is suited to such management practices as livestock ponds, livestock pipelines, and range seeding. Good grazing management can increase the productivity and reproduction potential of western wheatgrass and alkali sacaton. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive.

577—Cabezon-Montecito-Rock outcrop association, 1 to 10 percent slopes. This map unit is on hills, ridges, and valley bottoms. Areas are irregular in shape and are 1,000 to 6,000 acres in size. The native vegetation is mainly grasses, shrubs, juniper, and pinyon. Elevation is 7,100 to 7,500 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 47 to 52 degrees F, and the average frost-free period is 100 to 120 days.

This unit is 35 percent Cabezon very cobbly loam, 2 to 10 percent slopes, very stony; 30 percent Montecito clay loam, 1 to 5 percent slopes; and 20 percent Rock outcrop. The Cabezon soil is on lava hills and ridges, the Montecito soil is on the lower hillsides and in valleys between lava ridges, and the Rock outcrop is on hills and ridges.

Included in this unit are small areas of Millpaw soils on bottoms, Cantina soils on the lower hillsides and in valleys between lava ridges, and soils that are similar to the Montecito soil but are moderately deep and are on hillsides. Included areas make up about 15 percent of the total acreage.

The Cabezon soil is shallow and well drained. It formed in alluvium and windblown sediments. Typically, the surface layer is brown very cobbly loam about 2 inches thick. The subsoil is brown clay about 16 inches thick. Basalt is at a depth of about 18 inches.

Permeability is slow in the Cabezon soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Montecito soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is dark brown clay loam about 3 inches thick. The upper part of the subsoil is yellowish brown clay about 21 inches thick, and the lower part to a depth of 60 inches is light yellowish brown sandy clay.

Permeability is moderately slow in the Montecito soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt on hills and ridges.

This unit is used for livestock grazing and wood products.

The site index for pinyon and juniper on the Cabezon soil ranges from 34 to 52. Based on a site index of 43, the soil can produce 5 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. The main limitations are the depth to bedrock and the low available water capacity.

The understory vegetation on the Cabezon soil is blue grama, bottlebrush squirreltail, and muttongrass. Reducing the density of the canopy can increase the production of understory plants.

The potential natural plant community on the Montecito is mainly western wheatgrass, alkali sacaton, galleta, and winterfat. The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 600 pounds in unfavorable years.

The Montecito soil is suited to such management practices as livestock ponds, livestock pipelines, range seeding, and brush control. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive. Good grazing management can increase the productivity and reproduction potential of western wheatgrass and alkali sacaton.

The main limitations affecting the use of this unit for livestock grazing are the Rock outcrop and the depth to bedrock and stones on the surface in areas of the Cabezon soil.

579—Cabezon-Cantina complex, 1 to 7 percent slopes. This map unit is on hills and in valleys between basalt ridges. Areas are irregular in shape and are 1,000 to 3,000 acres in size. The native vegetation is mainly trees and an understory of grasses. Elevation is 7,100 to 7,500 feet. The average annual precipitation is about 14 to 16 inches, the average annual air temperature is 47 to 51 degrees F, and the average frost-free period is 100 to 120 days.

This unit is 45 percent Cabezon very cobbly sandy loam, 1 to 7 percent slopes, very stony, and 40 percent Cantina sandy loam, 1 to 3 percent slopes. The Cabezon soil is on hills, and the Cantina soil is on the lower hills and in valleys between basalt ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of soils that are similar to the Cantina soil but are moderately deep, Millpaw and Montecito soils in valleys between lava

ridges, and Rock outcrop on basalt hills and ridges. Included areas make up about 15 percent of the total acreage.

The Cabezon soil is shallow and well drained. It formed in alluvium and windblown sediments. Typically, the surface layer is brown very cobbly sandy loam about 2 inches thick. The subsoil is dark yellowish brown sandy clay about 12 inches thick. Basalt is at a depth of about 14 inches.

Permeability is slow in the Cabezon soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Cantina soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is brown sandy loam about 2 inches thick. The upper part of the subsoil is brown sandy clay loam about 7 inches thick, the next part is brown sandy clay about 22 inches thick, and the lower part is strong brown sandy clay loam about 23 inches thick. Basalt is at a depth of about 54 inches.

Permeability is slow in the Cantina soil. Available water capacity is high. The effective rooting depth is 40 to 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is moderate.

This unit is used for livestock grazing and wood products.

The site index for pinyon and juniper on the Cabezon soil ranges from 34 to 52. Based on a site index of 43, the soil can produce 5 cords of wood per acre from trees that average 5 inches in diameter at a height of 1 foot. The main limitations affecting the use of this soil for wood products are the depth to bedrock and the low available water capacity.

The site index for pinyon and juniper on the Cantina soil ranges from 39 to 70. Based on a site index of 55, the soil can produce 7 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot.

The understory vegetation on this unit is blue grama, bottlebrush squirreltail, and muttongrass.

581—Laporte-Vessilla complex, 3 to 15 percent slopes. This map unit is on hilltops and ridges. Areas are irregular in shape and are 500 to 1,500 acres in size. The native vegetation is mainly trees and grasses. Elevation is 7,000 to 7,500 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 110 to 125 days.

This unit is 45 percent Laporte gravelly loam, 3 to 15 percent slopes, and 35 percent Vessilla sandy loam, 3 to 15 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Mion soils on hills, Rock outcrop on hills and ridges, and Ribera soils on ridges. Included areas make up about 20 percent of the total acreage.

The Laporte soil is shallow and well drained. It formed in alluvium and windblown sediments derived dominantly from limestone. Typically, the surface layer is very dark grayish brown gravelly loam about 1 inch thick. The upper part of the underlying material is dark grayish brown gravelly loam about 14 inches thick, and the lower part is brown gravelly loam about 3 inches thick. Limestone is at a depth of about 18 inches.

Permeability is moderate in the Laporte soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Vessilla soil is shallow and well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is dark brown sandy loam about 6 inches thick. The underlying material is light brown sandy loam about 12 inches thick. Sandstone is at a depth of about 18 inches.

Permeability is moderately rapid in the Vessilla soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for fuel wood production and livestock grazing.

The site index for pinyon and juniper on this unit generally ranges from 40 to 50. Based on a site index of 45, the unit can produce 7 cords of wood per acre in a stand of trees that average 5 inches in diameter at a height of 1 foot. In the vicinity of Oso Ridge Lookout, the site index for pinyon and juniper is higher on the Laporte soil. The overstory in this area consists of scattered ponderosa pine, Rocky Mountain juniper, alligator juniper, oneseed juniper, pinyon, and Gambel oak.

The understory vegetation on this unit is little bluestem, New Mexico feathergrass, blue grama, and sideoats grama. Reducing the density of the canopy can increase the production of understory plants.

582—Kenray fine sand, 3 to 15 percent slopes. This deep, excessively drained soil is on dunes, hills, and mesas. It formed in eolian material derived dominantly from sandstone. Areas are irregular in shape and are 200 to 1,300 acres in size. The native vegetation is mainly ponderosa pine, shrubs, and

grasses. Elevation is 7,300 to 8,000 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 43 to 45 degrees F, and the average frost-free period is 90 to 110 days.

Typically, the surface layer is brown fine sand about 15 inches thick. The underlying material to a depth of 60 inches is light yellowish brown and brownish yellow loamy sand.

Included in this unit are small areas of Pinitos and Ribera soils on hillsides at the lower elevations, soils that are similar to the Kenray soil but are moderately deep or shallow and are on hills, Techado soils on hills, and Valnor soils on mesas. Included areas make up about 20 percent of the total acreage.

Permeability is rapid in the Kenray soil. Available water capacity is low. The effective rooting depth is 60 inches. Runoff is slow, and the hazard of water erosion is slight. The hazard of soil blowing is severe.

This unit is used for limited wood products and livestock grazing.

This unit is suited to the production of ponderosa pine. The site index for ponderosa pine ranges from 50 to 65. Based on a site index of 60, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of soil blowing, equipment limitations, seedling mortality, and plant competition. The sandy texture of the surface layer can interfere with felling, yarding, and other activities involving the use of equipment. When timber is harvested, minimizing the risk of erosion is essential. Special design of logging roads, skid trails, and landings is needed. Erosion-control structures and seeding can protect the roads, trails, and landings against erosion. Because of the low available water capacity, the seedling mortality rate is moderate on the north- and east-facing slopes and severe on the south- and west-facing slopes. Carefully managing reforestation can minimize competition from undesirable understory plants. Unless the site is adequately prepared, plant competition can prevent or delay the natural or artificial regeneration of trees. In the Zuni Mountains, Gambel oak and various grasses limit the natural regeneration of ponderosa pine. At the lower elevations, pinyon, oneseed juniper, skunkbush sumac, and oaks limit natural regeneration. Properly preparing the site can control competing vegetation. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality.

The understory vegetation on this unit is blue grama, Arizona fescue, mountain muhly, and Gambel oak.

585—Moncha silt loam, 2 to 10 percent slopes. This deep, well drained soil is in valleys, on fan terraces, and on mesa tops. It formed in alluvium derived from siltstone and shale. Areas are irregular in shape and are 100 to 1,000 acres in size. The native vegetation is mainly grasses and a few scattered trees. Elevation is 6,800 to 7,300 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 48 to 52 degrees F, and the average frost-free period is 115 to 130 days.

Typically, the surface layer is light red silt loam about 2 inches thick. The subsoil is red silty clay loam about 19 inches thick. The substratum to a depth of 60 inches also is red silty clay loam.

Included in this unit are small areas of Venadito soils in depressions and along drainageways, Teco soils in depressions, and Flugle and Goesling soils on fan terraces. Included areas make up about 15 percent of the total acreage.

Permeability is moderately slow in the Moncha soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing. The potential natural plant community on the Moncha soil is mainly alkali sacaton, spike muhly, western wheatgrass, bottlebrush squirreltail, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 800 pounds per acre in favorable years to 300 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, spike muhly, and alkali sacaton decrease in abundance and blue grama, cacti, broom snakeweed, and rabbitbrush increase. The increasers normally occur in small amounts in the potential natural plant community. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive.

Deterioration of the plant community often results in the formation of deep, vertical-walled gullies that drain the site and hinder the production of vegetation. After the gullies have drained the site, a combination of grazing management and engineering practices may be needed to return the site to its productive potential.

This soil is suited to such management practices as fencing and livestock pipelines.

586—Venadito-Teco association, 0 to 10 percent slopes. This map unit is on valley bottoms and sides and on hills. Areas are irregular in shape and are 75 to 1,300 acres in size. The native vegetation is mainly

grasses and a few scattered trees. Elevation is 6,500 to 7,500 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 40 to 53 degrees F, and the average frost-free period is 115 to 135 days.

This unit is 60 percent Venadito clay loam, 0 to 5 percent slopes, and 25 percent Teco clay loam, 2 to 10 percent slopes. The Venadito soil is on valley bottoms and the lower valley sides, and the Teco soil is on valley sides and hills.

Included in this unit are small areas of Flugle soils on fan terraces, Quintana soils on hills, and Aparejo, Catman, and Hickman soils along drainageways. Included areas make up about 15 percent of the total acreage.

The Venadito soil is deep and well drained. It formed in alluvium derived dominantly from shale. Typically, the surface layer is reddish brown clay loam about 3 inches thick. The underlying material to a depth of 60 inches is reddish brown clay.

Permeability is very slow in the Venadito soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight. This soil has prominent slickensides and cracks that extend to a depth of about 35 inches. It is occasionally flooded for very brief periods in summer.

The Teco soil is deep and well drained. It formed in alluvium derived dominantly from shale and sandstone. Typically, the surface layer is reddish brown clay loam about 3 inches thick. The upper 25 inches of the subsoil is reddish brown clay and clay loam, and the lower part to a depth of 60 inches is light reddish brown clay loam.

Permeability is moderately slow in the Teco soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing. The potential natural plant community on the Venadito soil is mainly western wheatgrass, vine mesquite, alkali sacaton, blue grama, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 3,200 pounds per acre in favorable years to 900 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and vine mesquite decrease in abundance and blue grama increases. Blue grama normally occurs in small amounts in the potential natural plant community.

The potential natural plant community on the Teco soil is mainly alkali sacaton, western wheatgrass, galleta, and winterfat. The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 600 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, alkali sacaton, and winterfat decrease in abundance and muhly, dropseed, and rabbitbrush increase. The increasers normally occur in small amounts in the potential natural plant community.

The Venadito soil is suitable as a site for livestock ponds. The Teco soil is suited to such management practices as livestock ponds, livestock pipelines, and range seeding.

Good grazing management on this unit can increase the productivity and reproduction potential of western wheatgrass.

591—Valnor-Techado association, 2 to 25 percent slopes. This map unit is on hills, plateaus, and mesas. Areas are irregular in shape and are 100 to 4,500 acres in size. The native vegetation is mainly pine trees and an understory of grasses. Elevation is 7,500 to 8,200 feet. The average annual precipitation is about 16 to 20 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 45 percent Valnor clay loam, 2 to 7 percent slopes, and 40 percent Techado channery clay loam, 5 to 25 percent slopes. The Valnor soil is on mesa tops, hilltops, and plateaus, and the Techado soil is on hillsides and hilltops.

Included in this unit are small areas of soils that are similar to the Valnor soil but have shale below a depth of 40 inches and are on mesa tops, soils that are similar to the Valnor and Techado soils but have less clay in the subsoil and are on hills and mesas, Rock outcrop on hills and mesas, and Catman soils along narrow drainageways. Included areas make up about 15 percent of the total acreage.

The Valnor soil is moderately deep and well drained. It formed in alluvium derived dominantly from shale and sandstone. Typically, the surface layer is yellowish brown clay loam about 2 inches thick. The upper part of the subsoil is dark yellowish brown and yellowish brown clay about 16 inches thick, and the lower part is light yellowish brown clay about 20 inches thick. Soft shale is at a depth of about 38 inches.

Permeability is slow in the Valnor soil. Available water capacity is moderate. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Techado soil is shallow and well drained. It formed in alluvium derived from shale and sandstone. Typically, the surface layer is light olive brown channery clay loam about 3 inches thick. The underlying material is light olive brown clay about 13 inches thick. Soft shale is at a depth of about 16 inches. In areas near

the boundary of Catron County, the underlying material has less clay.

Permeability is slow in the Techado soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used for livestock grazing and wood products.

This unit is suited to limited production of ponderosa pine. The site index for ponderosa pine ranges from 43 to 47. Based on a site index of 45, the potential production of merchantable timber is 1,990 cubic feet, or 6,200 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 34 cubic feet, or 107 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting wood products are the hazard of erosion, plant competition, a slow growth rate, seedling mortality, and equipment limitations. Also, the Techado soil is subject to windthrow during periods when the soil is excessively wet and winds are strong. When timber is harvested, minimizing the risk of erosion is essential. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Constructing water bars and seeding cut and filled areas can protect logging roads and landings against erosion. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Brushy plants, such as Gambel oak and juniper, limit the natural regeneration of ponderosa pine. Thinning the stand can accelerate the growth of desirable trees. The seedling mortality rate is moderate because of the clayey texture. Conventional methods of harvesting timber generally can be used, but their use may be limited when the soils are wet.

The understory vegetation on the Valnor soil is Arizona fescue, mountain muhly, western wheatgrass, and Gambel oak, and that on the Techado soil is blue grama, spike muhly, gray horsebrush, and Gambel oak.

610—Grieta-Shiprock association, 1 to 10 percent slopes. This map unit is on hills, ridges, fan terraces, and stable dunes. Areas are irregular in shape and are 50 to 1,250 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 5,400 to 6,100 feet. The average annual precipitation is about 7 to 10 inches, the average annual air temperature is 51 to 55 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 65 percent Grieta sandy loam, 1 to 7 percent slopes, and 20 percent Shiprock sandy loam, 3 to 10 percent slopes. The Grieta soil is on hilltops, on fan terraces, and in interdune areas, and the Shiprock soil is on stable dunes, ridges, and hills.

Included in this unit are small areas of Sheppard soils on stable dunes, Kiki soils on hills, and Suwanee and Navajo soils on flood plains. Included areas make up about 15 percent of the total acreage.

The Grieta soil is deep and well drained. It formed in wind-modified, mixed alluvium. Typically, the surface layer is strong brown sandy loam about 3 inches thick. The subsurface layer also is strong brown sandy loam. It is about 5 inches thick. The upper part of the subsoil is strong brown sandy clay loam about 20 inches thick. The lower part to a depth of 60 inches is pink and pinkish white sandy loam. It has a high content of calcium carbonate.

Permeability is moderate in the Grieta soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Shiprock soil is deep and well drained. It formed in wind-modified, mixed alluvium. Typically, the surface layer is reddish yellow sandy loam about 3 inches thick. The subsurface layer is brown sandy loam about 10 inches thick. The upper part of the subsoil is brown sandy loam about 12 inches thick, and the lower part to a depth of 60 inches is reddish yellow sandy loam.

Permeability is moderately rapid in the Shiprock soil. Available water capacity is moderate. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing. The potential natural plant community on the Grieta soil is mainly bush muhly, black grama, galleta, and winterfat. The average annual production of air-dry vegetation ranges from 800 pounds per acre in favorable years to 400 pounds in unfavorable years. If the plant community deteriorates, bush muhly, black grama, galleta, and winterfat decrease in abundance and blue grama, broom snakeweed, and annuals increase. The increasers normally occur in small amounts in the potential natural plant community.

The potential natural plant community on the Shiprock soil is mainly black grama, Indian ricegrass, and dropseed. The average annual production of air-dry vegetation ranges from 900 pounds per acre in favorable years to 400 pounds in unfavorable years. If the plant community deteriorates, black grama and Indian ricegrass decrease in abundance and ring muhly, threeawn, annuals, and cacti increase. The increasers

normally occur in small amounts in the potential natural plant community.

Good management is needed to protect the soils against excessive soil blowing. Soil blowing can be controlled and damage to seedlings minimized by maintaining enough plant residue on the surface.

This unit is not suitable as a site for livestock ponds and range seeding because of seepage and droughtiness. It is suited to such management practices as livestock pipelines, fencing, deferred grazing, and rotation grazing.

611—Grieta-Kiki sandy loams, 3 to 15 percent slopes. This map unit is on knolls, ridges, and hills. Areas are irregular in shape and are 50 to 700 acres in size. The native vegetation is mainly grasses and forbs. Elevation is 5,500 to 6,000 feet. The average annual precipitation is about 7 to 10 inches, the average annual air temperature is 51 to 55 degrees F, and the average frost-free period is 140 to 165 days.

This unit is 50 percent Grieta sandy loam, 3 to 10 percent slopes, and 35 percent Kiki sandy loam, 3 to 15 percent slopes. The Grieta soil is on the lower parts of hills, and the Kiki soil is on knolls and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of shallow, loamy soils on hilltops and hills, Rock outcrop on hilltops, Suwanee and Navajo soils on flood plains, and Shiprock soils on hills. Included areas make up about 15 percent of the total acreage.

The Grieta soil is deep and well drained. It formed in mixed alluvium reworked by the wind. Typically, the surface layer is yellowish red sandy loam about 3 inches thick. The upper part of the subsoil is yellowish red sandy clay loam about 10 inches thick, and the lower part to a depth of 60 inches is reddish yellow, yellowish red, and reddish brown sandy clay loam.

Permeability is moderate in the Grieta soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Kiki soil is moderately deep and well drained. It formed in eolian material and mixed alluvium. Typically, the surface layer and subsurface layer are strong brown sandy loam. They are each about 3 inches thick. The upper part of the subsoil is strong brown sandy clay loam about 8 inches thick, and the lower part is strong brown sandy clay loam about 10 inches thick. Basalt is at a depth of about 24 inches.

Permeability is moderate in the Kiki soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing and urban development.

The potential natural plant community on the Grieta soil is mainly black grama, galleta, bush muhly, and winterfat. The average annual production of air-dry vegetation ranges from 800 pounds per acre in favorable years to 400 pounds in unfavorable years. If the plant community deteriorates, black grama and winterfat decrease in abundance and broom snakeweed, forbs, and cacti increase. The increasers normally occur in small amounts in the potential natural plant community.

The potential natural plant community on the Kiki soil is mainly black grama, Indian ricegrass, and dropseed. The average annual production of air-dry vegetation ranges from 900 pounds per acre in favorable years to 400 pounds in unfavorable years. If the plant community deteriorates, black grama and Indian ricegrass decrease in abundance and ring muhly, sandhill muhly, annuals, and cacti increase. The increasers normally occur in small amounts in the potential natural plant community.

Good management is needed to protect the soils against excessive soil blowing. Soil blowing can be controlled and damage to seedlings minimized by maintaining enough plant residue on the surface.

This unit is not suitable as a site for livestock ponds and range seeding because of seepage and droughtiness.

The trees and shrubs selected for windbreaks and environmental plantings should be those that are tolerant of droughtiness. Unless the seedlings on the Kiki soil are irrigated, the mortality rate is moderate because of the moisture stress caused by the low available water capacity. Unless the young seedlings are protected during high winds, they can be damaged by sand blasting or covered with drifting sand. Soil blowing can be controlled by maintaining strips of native vegetation between the rows of trees and shrubs. Undesirable grasses and weeds can be controlled by applying herbicides and by rototilling or hand hoeing.

The soils in this unit are suited to urban development. The main management concerns are the hazard of soil blowing, the high content of calcium carbonate in the Grieta soil, and the depth to bedrock in the Kiki soil. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees.

615—Trag-Techado-Rock outcrop complex, 3 to 55 percent slopes. This map unit is on mountainsides, ridges, benches, and escarpments. Areas are irregular in shape and are 200 to 3,000 acres in size. The native vegetation is mainly trees, shrubs, and grasses. Elevation is 7,200 to 8,900 feet. The average annual precipitation is about 16 to 22 inches, the average annual air temperature is 40 to 45 degrees F, and the average frost-free period is 90 to 110 days.

This unit is 35 percent Trag cobbly loam, 3 to 30 percent slopes; 30 percent Techado cobbly clay loam, 5 to 55 percent slopes; and 20 percent Rock outcrop. The Trag soil is on benches and mountainsides, the Techado soil is on mountainsides and ridges, and the Rock outcrop is on ridges and escarpments.

Included in this unit are small areas of Parkay soils on mountainsides and benches; on benches and mountainsides, soils that are similar to the Trag soil but have an accumulation of calcium carbonate; on benches and ridges, soils that are similar to the Techado soil but are underlain by basalt and have an accumulation of calcium carbonate; and, on benches, mountainsides, and ridges, soils that are similar to the Techado and Trag soils but are moderately deep. Included areas make up about 15 percent of the total acreage.

The Trag soil is deep and well drained. It formed in mixed alluvium and colluvium. Typically, the surface layer is dark grayish brown cobbly loam about 2 inches thick. The subsoil is yellowish brown and brown cobbly sandy clay loam about 33 inches thick. The substratum to a depth of 60 inches is light brown cobbly sandy loam. In some areas bedrock is at a depth of 40 to 60 inches.

Permeability is moderate in the Trag soil. Available water capacity also is moderate. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

The Techado soil is shallow and well drained. It formed in alluvium and colluvium derived dominantly from shale and sandstone. Typically, the surface layer is light yellowish brown cobbly clay loam about 2 inches thick. The underlying material is about 17 inches of dark yellowish brown clay loam and sandy clay. Soft shale is at a depth of about 19 inches.

Permeability is slow in the Techado soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing is moderate.

The Rock outcrop consists of barren or nearly barren areas of exposed sandstone, andesite, or basalt on escarpments, benches, and mountainsides.

This unit is used for wood products and livestock grazing.

This unit is suited to the production of ponderosa pine. The site index ranges from 61 to 66 on the Trag soil and averages 56 on the Techado soil. Based on a site index of 60, the potential production of merchantable timber is 3,570 cubic feet, or 14,600 board feet (International rule, ⅛-inch kerf), per acre in an even-aged, fully stocked stand of trees 100 years old. The culmination of mean annual increment is 46 cubic feet, or 177 board feet (International rule, ⅛-inch kerf), per acre.

The main concerns in producing and harvesting timber are the hazard of water erosion and plant competition. Equipment limitations and the hazard of windthrow also are concerns on the Techado soil. When timber is harvested, minimizing the risk of erosion is essential. Proper design of road drainage systems and care in the placement of culverts help to control erosion. Spoil from excavations is subject to rill and gully erosion and to sloughing. Constructing water bars and seeding cut and filled areas can protect logging roads and landings against erosion. Leaving an undisturbed buffer or filter strip along watercourses minimizes sedimentation and thus helps to maintain water quality.

Carefully managing reforestation can minimize competition from undesirable understory plants. Plant competition delays natural regeneration but does not prevent the eventual development of a fully stocked, normal stand of trees. Grasses, forbs, and shrubs limit the natural regeneration of ponderosa pine. Properly preparing the site can control the competing vegetation.

Conventional methods of harvesting can be used in the areas that have slopes of less than 35 percent slopes, but their use is limited in the steeper areas. Harvesting activities are hindered when the soil is wet. Special design of logging roads, skid trails, and landings is needed in the steeper areas. Erosion-control structures and seeding can protect the roads against erosion. Trees on the Techado soil are subject to windthrow because of the limited rooting depth.

The understory vegetation on this unit is Arizona fescue, mountain muhly, and Gambel oak.

618—Netoma sandy loam, 2 to 12 percent slopes. This deep, well drained soil is on fan terraces and hills. It formed in alluvium derived dominantly from gypsiferous material. Areas are irregular in shape and are 50 to 800 acres in size. The native vegetation is mainly grasses and scattered trees. Elevation is 5,800 to 6,500 feet. The average annual precipitation is about

10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

Typically, the surface layer is strong brown sandy loam about 4 inches thick. The upper part of the subsoil is strong brown sandy loam about 8 inches thick, and the lower part to a depth of 60 inches is light brown and reddish yellow, gypsiferous sandy loam. In areas near the boundary of Bernalillo County, the soils have a higher content of clay and shale crops out.

Included in this unit are small areas of Grieta, Kiki, Shiprock, and Penistaja soils on fan terraces; soils that are similar to the Netoma soil but are gravelly or have more clay in the subsoil and are on fan terraces and hillsides; soils that are similar to the Netoma soil but soft bedrock at a depth of less than 40 inches and are on hills, mainly near the boundary of Socorro County; and Harvey soils on hills, mainly near the boundary of Socorro County. Included areas make up about 15 percent of the total acreage.

Permeability is moderately rapid in the Netoma soil. Available water capacity is moderate. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe. This soil is slightly saline.

This unit is used for livestock grazing. The potential natural plant community is mainly western wheatgrass, blue grama, Indian ricegrass, and spike dropseed. The average annual production of air-dry vegetation ranges from 850 pounds per acre in favorable years to 325 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass and Indian ricegrass decrease in abundance and blue grama and rabbitbrush increase. The increasers normally occur in small amounts in the potential natural plant community.

This unit is suited to such management practices as livestock pipelines, brush control, and seeding. It is not suitable as a site for livestock ponds because of seepage, piping, and the content of gypsum. Good grazing management can increase the productivity and reproduction potential of western wheatgrass.

619—Venadito clay loam, 1 to 5 percent slopes. This deep, well drained soil is on alluvial fans and flood plains and in valleys. It formed in alluvium derived dominantly from shale. Areas are irregular in shape and are 50 to 2,000 acres in size. The native vegetation is mainly grasses and shrubs. Elevation is 6,200 to 7,500 feet. The average annual precipitation is about 10 to 13 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

Typically, the surface layer is reddish brown clay loam about 4 inches thick. The underlying material to a depth of 60 inches is reddish brown clay.

Included in this unit are small areas of Aparejo soils on alluvial fans and flood plains and in valleys and Penistaja soils on fan terraces and valley sides. Included areas make up about 10 percent of the total acreage.

Permeability is very slow in the Venadito soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate. Cracks that extend to a depth of about 30 inches are common. This soil is occasionally flooded for very brief periods in summer.

This unit is used for livestock grazing. The potential natural plant community is mainly western wheatgrass, vine mesquite, alkali sacaton, spike muhly, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 3,200 pounds per acre in favorable years to 1,250 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, spike muhly, and winterfat decrease in abundance and blue grama, threeawn, annual grasses and forbs, and rabbitbrush increase. The increasers normally occur in small amounts in the potential natural plant community. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive.

Good grazing management can increase the productivity and reproduction potential of western wheatgrass, vine mesquite, alkali sacaton, and spike muhly. Grazing should be delayed until the soil is firm and the more desirable forage plants have achieved enough growth to withstand grazing pressure. Deterioration of the vegetation on this unit often results in the formation of gullies that drain the site and hinder the production of vegetation. After deep gullies have artificially drained the site, a combination of grazing management and engineering practices may be needed to return the site to its productive potential.

620—Aparejo-Venadito complex, 1 to 5 percent slopes. This map unit is on flood plains and in large drainageways. Areas are irregular in shape and are 150 to 1,300 acres in size. The native vegetation is mainly grasses and scattered shrubs. Elevation is 6,200 to 7,500 feet. The average annual precipitation is about 12 to 14 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 50 percent Aparejo silt loam, 1 to 5 percent slopes, and 35 percent Venadito silty clay loam, 1 to 5 percent slopes. The Aparejo soil is on flood plains and the bottom of drainageways, and the Venadito soil is on flood plains and in drainageways. The components of this unit occur as areas so

intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Flugle and Penistaja soils on small hills and fan terraces, Catman and Hickman soils on flood plains, and riverwash in arroyos. Included areas make up about 15 percent of the total acreage.

The Aparejo soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is yellowish red silt loam about 2 inches thick. The upper part of the underlying material is yellowish red silty clay loam about 16 inches thick. The lower part to a depth of 60 inches is dominantly yellowish red silt loam, but it commonly has strata of sandy loam, clay loam, or clay less than 0.5 inch thick.

Permeability is moderately slow in the Aparejo soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate. This soil is occasionally flooded for very brief periods in summer.

The Venadito soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is reddish brown silty clay loam about 3 inches thick. The upper part of the underlying material is reddish brown clay about 24 inches thick, and the lower part to a depth of 60 inches is yellowish red clay.

Permeability is very slow in the Venadito soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate. This soil is occasionally flooded for very brief periods in summer. Cracks extend to a depth of about 30 inches.

This unit is used for livestock grazing. The potential natural plant community is mainly western wheatgrass, vine mesquite, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 3,200 pounds per acre in favorable years to 1,250 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, alkali sacaton, Indian ricegrass, and winterfat decrease in abundance and blue grama, galleta, rabbitbrush, and broom snakeweed increase. The unit receives runoff from the adjacent areas. As a result, it is potentially more productive.

Deterioration of the plant community on this unit often results in the formation of deep gullies that drain the site and hinder the production of vegetation. After deep gullies have artificially drained the site, a combination of grazing management and engineering practices may be needed to return the site to its productive potential.

The suitability of the Aparejo soil for livestock ponds is limited because of seepage. The Venadito soil is suitable as a site for these ponds. Good grazing management can increase the productivity and reproduction potential of western wheatgrass, alkali sacaton, and winterfat. The unit is suited to such management practices as deferred grazing, rotation grazing, livestock pipelines, and fencing.

625—Hagerman-Bond association, 1 to 10 percent slopes. This map unit is on mesa tops, cuestas, hills, and ridges. Areas are irregular in shape and are 50 to 1,500 acres in size. The native vegetation is mainly grasses and some scattered trees. Elevation is 6,000 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 55 percent Hagerman fine sandy loam, 1 to 5 percent slopes, and 30 percent Bond sandy loam, 2 to 10 percent slopes. The Hagerman soil is on mesa tops, on the lower dip slopes of cuestas, and on hills and ridges, and the Bond soil is on mesa tops, on the upper dip slopes of cuestas, and on hilltops and ridges. In areas near the boundary of Socorro County, the soils have a less well developed subsoil and there is more Rock outcrop.

Included in this unit are small areas of Skyvillage soils on hills and ridgetops, mainly near the boundary of Bernalillo County; Penistaja soils on the lower side slopes; Rock outcrop on hilltops, ledges, ridges, and escarpments; and Mikim and Mion soils at the base of escarpments. Included areas make up about 15 percent of the total acreage.

The Hagerman soil is moderately deep and well drained. It formed in eolian and alluvial material derived dominantly from sandstone. Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsurface layer is dark brown fine sandy loam about 3 inches thick. The upper part of the subsoil is brown sandy clay loam about 17 inches thick, and the lower part is strong brown and light brown sandy loam about 11 inches thick. Sandstone is at a depth of about 34 inches.

Permeability is moderate in the Hagerman soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Bond soil is shallow and well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is brown sandy loam about 5 inches thick. The subsoil is dark brown sandy clay loam about 10 inches thick. The substratum is strong

brown sandy clay loam about 3 inches thick. Hard sandstone is at a depth of about 18 inches.

Permeability is moderate in the Bond soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing and urban development.

The potential natural plant community on the Hagerman soil is mainly blue grama, western wheatgrass, sideoats grama, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, sideoats grama, and New Mexico feathergrass decrease in abundance and blue grama, galleta, ring muhly, and broom snakeweed increase. Pinyon and oneseed juniper may invade.

Good grazing management can increase the productivity and reproduction potential of western wheatgrass, sideoats grama, and spike muhly. The Hagerman soil is suited to such management practices as livestock pipelines, fencing, and range seeding.

The potential natural plant community on the Bond soil is mainly sideoats grama, Indian ricegrass, blue grama, and scattered oneseed juniper. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 275 pounds in unfavorable years. If the plant community deteriorates, sideoats grama, Indian ricegrass, and little bluestem decrease in abundance and juniper, broom snakeweed, sand sagebrush, and blue grama increase. The increasers normally occur in small amounts in the potential natural plant community.

Good grazing management can increase the productivity and reproduction potential of sideoats grama, little bluestem, and Indian ricegrass. The Bond soil is suited to such management practices as deferred grazing and rotation grazing. It is limited as a site for such management practices as livestock pipelines, fencing, and range seeding because of the depth to bedrock and droughtiness.

Properly managing livestock grazing can protect this unit against soil blowing. Soil blowing can be controlled and damage to seedlings minimized by maintaining enough plant residue on the surface. In some areas dense stands of pinyon and oneseed juniper may become established. If the stand in these areas is properly managed, a limited wood crop can be produced. The unit is not suitable as a site for livestock ponds because of the texture of the soils and the depth to bedrock.

If the soils in this unit are used for urban development, the main management concerns are the hazard of soil blowing, the depth to bedrock, and the slope in some areas. In summer, irrigation is needed in areas used for lawn grasses, shrubs, vines, shade trees, or ornamental trees. Properly designing buildings and roads can help to control soil blowing and overcome the slope and the depth to bedrock.

630—Bond-Rizozo-Rock outcrop complex, 2 to 20 percent slopes. This map unit is on ridges, escarpments, and hills. Areas are irregular in shape and are 70 to 1,000 acres in size. The native vegetation is mainly grasses and some scattered trees. Elevation is 6,000 to 6,700 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 35 percent Bond sandy loam, 2 to 20 percent slopes; 25 percent Rizozo loam, 5 to 20 percent slopes; and 25 percent Rock outcrop. The Bond soil is on hills and ridgetops. The Rizozo soil is on hills and ridges. The Rock outcrop is on escarpments, hills, and ridges. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Hagerman soils on fan terraces and Rana soils at the base of escarpments. Included areas make up about 15 percent of the total acreage.

The Bond soil is shallow and well drained. It formed in eolian material derived dominantly from sandstone. Typically, the surface layer is yellowish red sandy loam about 2 inches thick. The subsoil is yellowish red clay loam about 5 inches thick. The substratum is red loam about 12 inches thick. Sandstone is at a depth of about 19 inches. In some areas the surface layer is channery or very channery.

Permeability is moderate in the Bond soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Rizozo soil is shallow or very shallow and is well drained. It formed in eolian material derived dominantly from fine grained sandstone. Typically, the surface layer is reddish brown loam about 2 inches thick. The underlying material also is reddish brown loam. It is about 12 inches thick. Sandstone is at a depth of about 14 inches. In some areas the surface layer is channery or very channery.

Permeability is moderate in the Rizozo soil. Available water capacity is very low. The effective rooting depth is

5 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Rock outcrop consists of barren or nearly barren areas of exposed sandstone on hills, ridges, and escarpments.

This unit is used for livestock grazing. The potential natural plant community is mainly New Mexico feathergrass, Indian ricegrass, blue grama, sideoats grama, and juniper. The average annual production of air-dry vegetation ranges from 700 pounds per acre in favorable years to 275 pounds in unfavorable years. If the plant community deteriorates, sideoats grama, New Mexico feathergrass, and Indian ricegrass decrease in abundance and blue grama, oneseed juniper, and broom snakeweed increase. The increasers normally occur in small amounts in the potential natural plant community.

This unit is limited as a site for such management practices as livestock pipelines and range seeding because of the depth to bedrock and the very low available water capacity. It is suited to such practices as deferred grazing and rotation grazing. Good grazing management can increase the productivity and reproduction potential of sideoats grama, New Mexico feathergrass, and winterfat.

640—Flaco-Berto loams, 0 to 5 percent slopes. This map unit is on basalt-capped mesa tops. Areas are irregular in shape and are 150 to 3,000 acres in size. The native vegetation is mainly grasses and a few trees and shrubs. Elevation is 6,000 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 55 percent Flaco loam, 0 to 5 percent slopes, and 30 percent Berto loam, 1 to 5 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used. In areas near the boundary of the soil survey of the eastern part of Valencia County, temperatures are higher and the soils are less well developed and have a higher content of rock fragments.

Included in this unit are small areas of Harvey soils on mesa tops, soils that are similar to the Flaco and Berto soils but have more than 35 percent clay in the subsoil, Oelop soils along drainageways, and Rock outcrop on knolls and hills. Included areas make up about 15 percent of the total acreage.

The Flaco soil is moderately deep and well drained. It formed in mixed alluvium and windblown sediments. Typically, the surface layer is yellowish brown loam about 2 inches thick. The upper 9 inches of the subsoil is yellowish brown loam and clay loam, and the lower 18 inches is yellowish brown and light yellowish brown clay loam and loam. Basalt is at a depth of about 29 inches. In some areas the surface layer is cobbly or stony.

Permeability is moderately slow in the Flaco soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Berto soil is shallow and well drained. It formed in mixed alluvium and windblown sediments over basalt. Typically, the surface layer is brown loam about 2 inches thick. The upper 10 inches of the subsoil also is brown loam. The lower 6 inches is pink cobbly loam and loam. Basalt is at a depth of about 18 inches. In some areas the surface layer is cobbly or stony.

Permeability is moderate in the Berto soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

This unit is used for livestock grazing. The potential natural plant community on the Flaco soil is mainly western wheatgrass, New Mexico feathergrass, black grama, and winterfat. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, black grama, and winterfat decrease in abundance and blue grama, threeawn, broom snakeweed, and cacti increase. The increasers normally occur in small amounts in the potential natural plant community.

The Flaco soil is suitable as a site for livestock pipelines. It is not suitable as a site for livestock ponds because of the depth to bedrock.

The potential natural plant community on the Berto soil is mainly western wheatgrass, sideoats grama, black grama, alkali sacaton, and winterfat. The average annual production of air-dry vegetation ranges from 800 pounds per acre in favorable years to 400 pounds in unfavorable years. If the plant community deteriorates, sideoats grama, black grama, winterfat, and western wheatgrass decrease in abundance and blue grama, broom snakeweed, and cacti increase. The increasers normally occur in small amounts in the potential natural plant community.

The Berto soil is not suitable for livestock pipelines, livestock ponds, or range seeding because of the depth to bedrock and the low available water capacity.

The included Oelop soils in this unit receive runoff from the adjacent areas. As a result, they are potentially more productive. Areas of these soils provide about 20 percent of the available forage on the unit.

641—Berto-Flaco cobbly loams, 1 to 10 percent slopes. This map unit is on basalt-capped mesa tops. Areas are irregular in shape and are 100 to 2,500 acres in size. The native vegetation is mainly grasses and some scattered trees and shrubs. Elevation is 6,000 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 55 percent Berto cobbly loam, 1 to 10 percent slopes, and 30 percent Flaco cobbly loam, 1 to 10 percent slopes. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Harvey soils on mesa tops, soils that are similar to the Flaco and Berto soils but have more than 35 percent clay in the subsoil, and Rock outcrop on hills and mesa tops. Included areas make up about 15 percent of the total acreage.

The Berto soil is shallow and well drained. It formed in mixed alluvium and windblown sediments. Typically, the surface layer is brown cobbly loam about 2 inches thick. The upper part of the subsoil is brown clay loam about 6 inches thick, and the lower part is brown cobbly clay loam about 8 inches thick. Basalt is at a depth of about 16 inches. In some areas the surface layer is not cobbly.

Permeability is moderate in the Berto soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Flaco soil is moderately deep and well drained. It formed in mixed alluvium and windblown sediments. Typically, the surface layer is brown cobbly loam about 2 inches thick. The upper 7 inches of the subsoil is brown clay loam, and the lower 17 inches is yellowish brown and very pale brown clay loam and cobbly loam. Basalt is at a depth of about 26 inches. In some areas the surface layer is not cobbly.

Permeability is moderately slow in the Flaco soil. Available water capacity is low. The effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is slight.

This unit is used for livestock grazing. The potential natural plant community on the Berto soil is mainly blue grama, black grama, winterfat, little bluestem, alkali sacaton, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 800 pounds per acre in favorable years to 400 pounds in unfavorable years. If the plant community deteriorates, alkali sacaton and winterfat decrease in abundance and blue grama, broom snakeweed, and cacti increase. The increasers normally occur in small amounts in the potential natural plant community.

The potential natural plant community on the Flaco soil is mainly western wheatgrass, New Mexico feathergrass, black grama, and winterfat. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass, black grama, and winterfat decrease in abundance and blue grama, threeawn, broom snakeweed, and cacti increase. The increasers normally occur in small amounts in the potential natural plant community.

The suitability of this unit for such management practices as livestock pipelines and fencing is limited because of the content of rock fragments and the depth to bedrock. The unit is not suitable for livestock ponds or range seeding because of the depth to bedrock and the low available water capacity.

645—Penistaja-Oelop association, 0 to 5 percent slopes. This map unit is on fan terraces and in swales. Areas are irregular in shape and are 450 to 2,000 acres in size. The native vegetation is mainly grasses. Elevation is 6,000 to 6,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 60 percent Penistaja sandy loam, 0 to 5 percent slopes, and 25 percent Oelop loam, 0 to 3 percent slopes. The Penistaja soil is on fan terraces, and the Oelop soil is in swales.

Included in this unit are small areas of Palma soils on hills, Aparejo and Venadito soils along drainageways and on alluvial fans, and Mikim and Zia soils on fan terraces. Included areas make up about 15 percent of the total acreage.

The Penistaja soil is deep and well drained. It formed in mixed alluvium reworked by the wind. Typically, the surface layer is brown sandy loam about 3 inches thick. The upper part of the subsoil is strong brown sandy clay loam about 15 inches thick, and the lower part to a depth of 60 inches is light brown and strong brown sandy loam.

Permeability is moderate in the Penistaja soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Oelop soil is deep and well drained. It formed in mixed alluvium. Typically, the surface layer is yellowish brown loam about 3 inches thick. The upper part of the subsoil is brown clay loam about 13 inches thick, and

the lower part to a depth of 60 inches is yellowish brown clay loam and loam.

Permeability is moderately slow in the Oelop soil. Available water capacity is very high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

This unit is used for livestock grazing. The potential natural plant community on the Penistaja soil is mainly blue grama, western wheatgrass, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 950 pounds per acre in favorable years to 375 pounds in unfavorable years. If the plant community deteriorates, western wheatgrass decreases in abundance and blue grama, ring muhly, and sand dropseed increase. The increasers normally occur in small amounts in the potential natural plant community.

Good grazing management can increase the productivity and reproduction potential of western wheatgrass, spike muhly, and sideoats grama. Properly managing livestock grazing can protect the Penistaja soil against soil blowing. Soil blowing can be controlled and damage to seedlings minimized by maintaining enough plant residue on the surface. The soil is suited to such management practices as fencing, range seeding, and livestock pipelines. It is not suitable as a site for livestock ponds because of seepage.

The potential natural plant community on the Oelop soil is mainly western wheatgrass, vine mesquite, and alkali sacaton. This soil receives runoff from the adjacent areas. As a result, it is potentially more productive. The average annual production of air-dry vegetation ranges from 1,350 pounds per acre in favorable years to 600 pounds in unfavorable years. If the plant community deteriorates, alkali sacaton, vine mesquite, and western wheatgrass decrease in abundance and blue grama, galleta, tumble windmillgrass, and mat muhly increase. The increasers normally occur in small amounts in the potential natural plant community.

Properly managing livestock grazing can protect the Oelop soil against water erosion. The soil is suitable as a site for erosion-control structures and livestock ponds.

650—Winona-Tanbark-Rock outcrop association, 15 to 60 percent slopes. This map unit is on mesa breaks, hills, ridges, and escarpments. Areas are irregular in shape and are 50 to 2,500 acres in size. The native vegetation is mainly grasses, shrubs, and scattered trees. Elevation is 5,800 to 6,800 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 45 percent Winona very gravelly loam, 15 to 45 percent slopes; 30 percent Tanbark loam, 25 to 60 percent slopes; and 15 percent Rock outcrop. The Winona soil is on mesa breaks and hills, the Tanbark soil is on ridges and hills, and the Rock outcrop is on escarpments, mesa breaks, hills, and ridgetops.

Included in this unit are small areas of Harvey soils on mesa breaks, mainly near the boundary of Socorro County; on hills and mesa breaks, soils that are similar to the Winona soil but are moderately deep; Suwanee and Aparejo soils in drainageways; and Hagerman soils on hills. Included areas make up about 10 percent of the total acreage.

The Winona soil is shallow and well drained. It formed in alluvium and windblown sediments derived dominantly from limestone. Typically, the surface layer is yellowish brown very gravelly loam about 3 inches thick. The subsoil is brown very cobbly loam about 12 inches thick. Limestone is at a depth of about 15 inches.

Permeability is moderate in the Winona soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing is severe.

The Tanbark soil is shallow and well drained. It formed in alluvial and eolian material derived dominantly from gypsum. Typically, the surface layer is very pale brown loam about 2 inches thick. The upper part of the underlying material is very pale brown, gypsiferous silt loam about 10 inches thick, and the lower part is white, gypsiferous sandy loam about 5 inches thick. Gypsum is at a depth of about 17 inches.

Permeability is moderate in the Tanbark soil. Available water capacity is very low. The effective rooting depth is 10 to 20 inches. Runoff is rapid, and the hazard of water erosion is severe. The hazard of soil blowing also is severe.

The Rock outcrop consists of barren or nearly barren areas of exposed limestone on escarpments, ridges, and mesa breaks.

This unit is used for livestock grazing. The potential natural plant community on the Winona soil is mainly New Mexico muhly, New Mexico feathergrass, black grama, blue grama, sideoats grama, winterfat, and scattered juniper. The average annual production of air-dry vegetation ranges from 1,200 pounds per acre in favorable years to 700 pounds in unfavorable years. If the plant community deteriorates, New Mexico feathergrass, sideoats grama, and black grama decrease in abundance and sacahuista, blue grama, and oneseed juniper increase. The increasers normally occur in small amounts in the potential natural plant community.

The potential natural plant community on the Tanbark soil is mainly gyp dropseed, alkali sacaton, galleta, hairy coldenia, and black grama. The average annual production of air-dry vegetation ranges from 475 pounds per acre in favorable years to 200 pounds in unfavorable years. If the plant community deteriorates, galleta, black grama, and sideoats grama decrease in abundance and gyp dropseed, threeawn, ring muhly, and hairy coldenia increase. The increasers normally occur in small amounts in the potential natural plant community.

The slope limits access by livestock. Constructing trails or walkways can allow the livestock to graze in areas where access is limited.

This unit is not suitable for livestock ponds, livestock pipelines, or range seeding because of the depth to bedrock, the slope, and the low available water capacity.

660—Rana-Rock outcrop complex, 2 to 25 percent slopes. This map unit is on mesa breaks, ridges, ledges, and escarpments. Areas are irregular in shape and are 900 to 7,000 acres in size. The native vegetation is mainly grasses and scattered trees and shrubs. Elevation is 5,800 to 7,000 feet. The average annual precipitation is about 10 to 12 inches, the average annual air temperature is 49 to 53 degrees F, and the average frost-free period is 120 to 140 days.

This unit is 45 percent Rana very cobbly clay, 2 to 25 percent slopes, very stony, and 40 percent Rock outcrop. The Rana soil is on benches and hills on mesa breaks, and the Rock outcrop is on ridges, ledges, and escarpments. The components of this unit occur as areas so intricately intermingled that mapping them separately was not practical at the scale used.

Included in this unit are small areas of Poley soils on ridges and mesa breaks; Torreon soils on hillsides on mesa breaks; on benches and hills on mesa breaks, soils that are similar to the Rana soil but are less than 40 inches deep over shale; and outcrops of sedimentary rock on ridges, ledges, and escarpments. Included areas make up about 15 percent of the total acreage.

The Rana soil is deep and well drained. It formed in alluvium and colluvium derived dominantly from red-bed shale. Typically, the surface layer is red very cobbly clay about 3 inches thick. The upper part of the underlying material is red clay about 31 inches thick, and the lower part to a depth of 60 inches is reddish brown clay.

Permeability is very slow in the Rana soil. Available water capacity is high. The effective rooting depth is 60 inches. Runoff is medium, and the hazard of water erosion is moderate. The hazard of soil blowing also is moderate.

The Rock outcrop consists of barren or nearly barren areas of exposed basalt on ridges and escarpments.

This unit is used for livestock grazing. The potential natural plant community on the Rana soil is mainly alkali sacaton, galleta, sideoats grama, black grama, and fourwing saltbush. The average annual production of air-dry vegetation ranges from 660 pounds per acre in favorable years to 250 pounds in unfavorable years. If the plant community deteriorates, alkali sacaton, sideoats grama, and black grama decrease in abundance and galleta, silver bluestem, and broom snakeweed increase. The increasers normally occur in small amounts in the potential natural plant community.

Good grazing management can increase the productivity and reproduction potential of alkali sacaton, sideoats grama, and black grama. The Rana soil is suited to such management practices as livestock ponds, livestock pipelines, and fencing.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded

during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 1,047 acres in the survey area would meet the soil requirements for prime farmland if an adequate and dependable supply of irrigation water were available. Most of the irrigated farmland in the area is subject to excessive soil blowing and therefore is not considered prime farmland.

The map units in the survey area that are considered prime farmland where irrigated are Clovis sandy clay loam, 1 to 3 percent slopes (unit 21) and Hickman sandy clay loam, 1 to 3 percent slopes (unit 75). The extent of the two map units is shown in table 2. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

By Kenneth R. Walker, district conservationist, Soil Conservation Service.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

About 4,500 acres in the survey area is irrigated cropland, most of which is in small tracts adjacent to dwellings. The supply of irrigation water is limited in most areas. Most of the small number of irrigation reservoirs in the survey area have a limited storage capacity. About 1,500 acres of nonirrigated cropland is in the Fence Lake area. The growing season in the survey area ranges from 100 to 160 days, depending on the elevation.

The primary crops in Bluewater Valley are alfalfa and small grain. A small acreage is used for potatoes, pinto beans, sweet corn, or millet. About 240 acres is used as irrigated pasture. The irrigation water in this area is provided by Bluewater Lake and by wells. Water from wells is used only when the allocation of water from the lake is less than 3 acre-feet per acre. The cropland in this valley is occasionally flooded for brief periods when snow melts in the spring.

Most of the nonirrigated cropland in the survey area is used for small grain that is grazed, but a small amount of dryland alfalfa is grown in the Fence Lake area. Enough acreage is excluded from grazing each year to allow for the harvest of seed for the next year's planting.

In the Bibo-Seboyeta, Laguna, and San Mateo communities, the main crops are truck crops, chiles, beans, and blue corn. Also, small orchards are in a few areas. The irrigation water in these areas is provided by small reservoirs constructed across two of the larger side arroyos and by the Rio San Jose.

All of the cropland in the Acoma area is used for garden crops, alfalfa, truck crops, or orchard crops,

mainly for home consumption. Some of the soils in this area have a high content of sodium and are highly saline.

In the Ramah Valley area, the main crop is small grain. A small acreage in this area is used as irrigated pasture. Irrigation water is provided by the Ramah Reservoir.

The main objectives in cropland management are proper irrigation, maintenance of good soil tilth and fertility, and control of water erosion and soil blowing. Measures that reduce salinity or sodicity and improve drainage also are needed in some areas. Salinity and sodicity can be reduced by leaching or by applying soil amendments.

Using a suitable cropping system helps to maintain good soil tilth, structure, aeration, and fertility. A single crop can be grown for many years on some soils with little adverse effect on yields. Other soils deteriorate rapidly if low-residue crops are grown unless large amounts of organic matter are added annually. Rotating crops helps to control insects, disease, and weeds.

Applying adequate amounts of irrigation water in a timely manner and avoiding overirrigation are essential for high yields. The irrigation system should be adapted to the soil and the crops grown. Overirrigation leaches nutrients from the root zone, results in excessive wetness of the lower part of the soil, and reduces aeration in the root zone.

Good management practices, such as planting improved varieties of crops, timely planting and harvesting, and applying fertilizer according to the needs of the crops, can increase yields of annual crops, hay crops, and pasture plants. Control of weeds, insects, and disease also helps to increase yields.

Good pasture management includes such practices as applying adequate fertilizer, clipping after grazing to remove excess forage and weeds, and rotation grazing.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 3. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 3 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops *(11)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of each map unit that includes irrigated land is shown in table 3. The classification of the other map units in the survey area is available at the local office of the Soil Conservation Service.

Rangeland

Mike Delancy, range conservationist, Soil Conservation Service, helped prepare this section.

Rangeland consists of areas that support a potential natural plant community of dominantly grasses, grasslike plants, forbs, and shrubs suitable for grazing or browsing. In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Effective management is based on the relationship between the soils and vegetation and water.

In the section "Detailed Soil Map Units," the relationship between soils and vegetation is expressed in terms of the potential natural plant community on the soils in the map units. In the following paragraphs, potential natural plant community and some of the other terms used in the map unit descriptions are defined.

The potential natural plant community is an association of plants that are best adapted to a unique combination of environmental factors. Even on similar soils, the proportion and production of these plants vary naturally from place to place and year to year. The dominant plant or plants are used to characterize a plant community because of their relative stability in areas that have not been disturbed or have not deteriorated. The grasses, forbs, and shrubs that characterize the potential natural plant community on each major soil are listed by common name in the map units.

Similar plant communities are grouped into range sites. A range site is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. The relationship between soils and vegetation was ascertained during this survey; thus, range sites generally can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table also are important. Information about the range sites in this survey area is available at the local offices of the Soil Conservation Service.

The average annual production is given in the map unit descriptions. It is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable and unfavorable years. In a favorable year, the amount and distribution of precipitation and the temperatures make growing conditions substantially better than average. In an unfavorable year, growing conditions are well below average, generally because of low available soil moisture. The total amount of vegetation that can be used for forage in a given area depends on the kinds of grazing animals, the grazing season, and uses of the

area for purposes other than grazing.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as those in the potential natural plant community for that site. Such management generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

About 60 percent of the survey area supports a plant community of dominantly grasses, forbs, and shrubs that are suitable for grazing or browsing. Nearly all of the wooded areas produce grazable understory. About 25 percent of the survey area receives enough snowfall to prevent winter grazing. Cow-calf enterprises are dominant, but some livestock producers maintain yearling enterprises.

Good grazing management includes practices that increase the extent of the ground cover, accumulate litter, and improve the vigor and reproduction potential of the more desirable grasses and shrubs. Continuous, year-round grazing or grazing every year during the growing season, usually from April through October, results in a deteriorated plant community that generally has a reduced value as forage.

Proper grazing use and deferred grazing, which varies the season of use during successive years, are needed to maintain a healthy, balanced plant community and to provide high-quality forage throughout the year. Resting pastures in summer encourages the growth and reproduction of warm-season grasses, such as sideoats grama, black grama, blue grama, and little bluestem. Resting pastures in spring encourages the growth of cool-season grasses, such as western wheatgrass and New Mexico feathergrass. Resting pastures in fall and winter encourages the growth of shrubs, such as mountainmahogany.

Flexibility in the number of grazing animals and in the frequency and intensity of grazing is essential if any grazing program is to be successful. Effective livestock distribution can be achieved through the use of fences, livestock water developments, salting facilities, and planned grazing systems.

Woodland Management and Productivity

Richard J. Reioux, forester, Soil Conservation Service, helped prepare this section.

A total of 1,078,592 acres in the survey area, or about 40 percent of the acreage, is woodland. Ponderosa pine, Douglas fir, and Engelmann spruce are the major commercial timber species in the area. They cover about 323,578 acres, or about 30 percent of the woodland in the area. The remaining 755,014 acres supports mainly pinyon and juniper *(9)*.

Logging in the Mount Taylor area and the Zuni Mountains began in the 1890's. These areas were logged extensively from the 1900's to the 1940's. In the Zuni Mountains, a narrow-gauge railroad was used to transport logs to the sawmills. From the late 1930's through World War II, areas that had appreciable amounts of ponderosa pine were cut over for the production of railroad ties.

The many periods of heavy cutting and the subsequent farming, overgrazing, and control of fires have resulted in the present forest conditions. Some wooded areas are understocked. The residual trees in these areas are of poor quality for timber. Many second-growth stands are overstocked and require thinning before optimum growth and yields can be achieved.

The dominant timber species in the survey area is ponderosa pine. Scattered Douglas fir and southwestern white pine are throughout the stands. The Zuni Mountains and the Mount Taylor area support no white fir (*Abies concolor*), which is common on most of the other woodland in the survey area. Ponderosa pine grows best at elevations above 8,000 feet, but it also grows at elevations as low as 7,300 feet. Douglas fir grows best on the north-facing slopes between elevations of 7,800 and 8,300 feet. Most of the Engelmann spruce and Douglas fir in the survey area is on Mount Taylor. Small areas of Douglas fir are on the cooler, north-facing slopes in the Zuni Mountains. The main species at elevations above 8,800 feet are Engelmann spruce and corkbar fir. Narrow bands of blue spruce are along some of the drainageways at the higher elevations.

Of the soils in the survey area, Moreno Variant, McGaffey, Moreno, Parkay, and Abersito soils have the highest potential for timber production. Timber can also be produced on Cebolleta, Cinnadale, and Charo soils.

Pinyon and oneseed juniper are common at elevations of 7,100 to 7,800 feet, but they also grow on

the south-facing slopes at elevations as high as 8,100 feet. Rocky Mountain juniper and alligator juniper are included in the overstory at the higher elevations. Although pinyon and juniper are not considered commercial species, they are used extensively for fuel wood, fenceposts, Christmas trees, and ornamental plantings. Pinyon also provides edible nuts.

Most of the understory in the areas of pinyon and juniper is used for livestock grazing. Thinning of trees and other practices are needed to obtain maximum forage production in many areas. The soils that support the best stands of pinyon and juniper are those of the Pintos, Ribera, Cantina, and Vessilla series. Other soils that support these trees are those of the Flugle, Nogal, and Cabezon series.

Good woodland management includes protection against fire, insects, and disease; thinning and pruning to improve tree growth and quality; reforestation; cutting to improve the stocking level; and proper watershed management.

Fire prevention or control is provided by the Forest Service, the New Mexico Division of Forestry, and private individuals. Proper silvicultural practices provide protection against insects, such as bark beetles, and diseases, such as dwarf mistletoe and red rot. Thinning and pruning of selected trees improves the quality of the timber and the growth potential of the site.

Reforestation can be achieved by natural regeneration and by planting. Proper site preparation may be needed to provide a good seedbed and minimize competition from shrubs and grasses.

Watershed management includes the proper location of skid trails, logging roads, and landings and the proper treatment of all areas disturbed by logging activities. Constructing water bars, cross ditching, and building out-sloping roads and then seeding grasses, forbs, and browse species help to control water erosion. Leaving a buffer strip of undisturbed soil and vegetation on both sides of watercourses also helps to control water erosion and minimizes the amount of sediment that can reach streams.

Table 4 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, a high content of rock fragments in the soil. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 4, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, and fire lanes and in log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are

moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

Plant competition ratings indicate the degree to which undesirable species are expected to invade and grow when openings are made in the tree canopy. The main factors that affect plant competition are depth to the water table and the available water capacity. A rating of *slight* indicates that competition from undesirable plants is not likely to prevent natural regeneration or suppress the more desirable species. Planted seedlings can become established without undue competition. A rating of *moderate* indicates that competition may delay the establishment of desirable species. Competition may hamper stand development, but it will not prevent the eventual development of fully stocked stands. A rating of *severe* indicates that competition can be expected to prevent regeneration unless precautionary measures are applied.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *productivity class*. The site index generally is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. For pinyon and juniper, however, the site index is determined by the basal area. The site index applies to fully stocked, even-aged, unmanaged stands. The site index curves for ponderosa pine were developed by Meyer *(7)*, those for Douglas fir by Edminster and Jump *(5)*, those for Engelmann spruce by Alexander *(1)*, and those for pinyon and juniper by Howell *(6)*. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, is the yield expressed in cubic meters per hectare per year calculated at the age of culmination for a fully stocked, unmanaged stand.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Woodland Understory Vegetation

Understory vegetation consists of grasses, forbs, shrubs, and other plants. If well managed, some woodland can produce enough understory vegetation to support grazing by livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive; therefore, the production of understory plants can be increased by thinning the trees in the overstory. In the section "Detailed Soil Map Units," the common understory plants are specified for the soils in the survey area that are used as woodland.

Windbreaks and Environmental Plantings

Richard J. Reioux, forester, Soil Conservation Service, helped prepare this section.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 5 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 5 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens.

The trees or shrubs selected for planting in windbreaks should be those that are suited to the soils on the site. Selecting suitable species helps to ensure the survival, rapid growth, and longevity of windbreaks. The soil characteristics that greatly affect the growth rate of trees and shrubs are permeability, available water capacity, and depth to bedrock.

Grazing can be detrimental to windbreaks and environmental plantings because livestock compact the soil and remove the lower branches of the trees and shrubs. Compaction retards growth, and removal of the lower branches reduces the effectiveness and esthetic value of the windbreaks. Weeds and insects prevent maximum growth rates. Clean cultivation and applications of herbicide help to control weeds. Fallowing a year before planting helps to ensure a sufficient soil moisture supply for the establishment of seedlings. Penistaja, Clovis, Glenberg, Mespun, Grieta,

and Kiki soils are subject to soil blowing. As a result, sites for windbreaks and environmental plantings on these soils should be prepared in spring.

Shallow soils and soils that have a high water table or a high content of salts or sodium are severely limited as sites for windbreaks and environmental plantings. Plantings can be successfully established in some areas of these soils if suitable species are selected and special management is applied.

An insufficient moisture supply hinders the survival of trees in urban areas and on cropland. Drip irrigation or other methods of irrigation are needed to reduce the seedling mortality rate and ensure continued growth.

Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from the local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

The soils of the survey area are rated in table 6 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 6, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 6 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 9 and interpretations for dwellings without basements and for local roads and streets in table 8.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Edwin A. Swenson, state biologist, Soil Conservation Service, helped prepare this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 7, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, wheatgrass, timothy, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are muhly, dropseed, buckwheat, wheatgrass, grama, tumbleweed, and mallow.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are ponderosa pine, spruce, Douglas fir, pinyon, and juniper.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, Apacheplume, oak, skunkbush sumac, sand sagebrush, and fourwing saltbush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, cattail, saltgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, playas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include coyote, striped skunk, cottontail, and pocket gopher.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, elk, mule deer, porcupine, chickadee, squirrels, and woodpeckers.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, tiger salamander, beaver, and leopard frog.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, black-tailed jackrabbit, prairie dog, horned lark, and prairie rattlesnake.

Engineering

Bernice A. Dyer, area engineer, Soil Conservation Service, helped prepare this section.

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 8 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell

potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity *(2, 3)*.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 9 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 9 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 9 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 9 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 10 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 10, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification

are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 11 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features generally are favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, irrigation, and terraces and diversions.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even more than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 12 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area *(8)*. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture *(10)*. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system *(3)* and the system adopted by the American Association of State Highway and Transportation Officials *(2)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 13 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2

millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 13, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 14 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet, receive precipitation from long-duration storms, and are not protected by a plant cover.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 14 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 14 are the depth to the seasonal high water table, the kind of water table, and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 14. Only saturated zones within a depth of about 6 feet are indicated. An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(12)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 15 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Fluvent (*Fluv*, meaning flood plain, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Ustifluvents (*Ust*, meaning ustic moisture regime, plus *fluvent*, the suborder of the Entisols characterized by an irregular decrease in carbon content).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Ustifluvents.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed (calcareous), mesic Typic Ustifluvents.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(10)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(12)*. Unless otherwise stated, matrix colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Abersito Series

The soils in the Abersito series are classified as clayey-skeletal, mixed Mollic Eutroboralfs. These moderately deep, well drained soils formed in mixed

colluvial and alluvial sediments. They are on hills and mesas. Slope is 5 to 30 percent. Elevation is 8,300 to 8,800 feet. The average annual precipitation is 20 to 24 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 85 to 105 days.

Typical pedon of Abersito very cobbly sandy clay loam, in an area of Abersito, cobbly-Abersito-Rock outcrop association, 5 to 30 percent slopes; about 0.5 mile southwest of Lookout Mountain; 1,100 feet east and 2,300 feet south of the northwest corner of sec. 2, T. 11 N., R. 14 W.

Oi—2 inches to 0; pine needles and oak leaves.

A—0 to 3 inches; brown (7.5YR 4/2) very cobbly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common fine and very fine irregular pores; about 40 percent cobbles, 10 percent gravel, and 5 percent stones; slightly acid; clear smooth boundary.

E—3 to 9 inches; light brown (7.5YR 6/4) very cobbly fine sandy loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine and few fine irregular pores; about 30 percent cobbles and 10 percent gravel; slightly acid; abrupt smooth boundary.

Bt—9 to 24 inches; yellowish red(5YR 5/6) very cobbly clay, yellowish red (5YR 4/6) moist; strong medium angular blocky structure; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine tubular pores; many thick clay films on faces of peds and in pores; about 35 percent cobbles and 5 percent gravel; slightly acid; abrupt smooth boundary.

2R—24 inches; sandstone.

The depth to bedrock ranges from 20 to 40 inches. The content of rock fragments in the control section ranges from 35 to 60 percent.

The A horizon is very cobbly sandy clay loam or gravelly loam. It has value of 4 or 5 (3 or 4 moist) and chroma of 2 or 3. The E horizon has value of 5 or 6 (3 or 4 moist) and chroma of 4 to 6. The Bt horizon has hue of 7.5YR or 5YR, value of 5 or 6 (4 or 5 moist), and chroma of 4 to 6.

Aparejo Series

The soils in the Aparejo series are classified as fine-loamy, mixed (calcareous), mesic Typic Ustifluvents. These deep, well drained soils formed in mixed alluvium. They are on flood plains and alluvial fans. Slope is 0 to 5 percent. Elevation is 6,200 to 7,500 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 110 to 140 days.

Typical pedon of Aparejo silt loam, in an area of Aparejo-Venadito complex, 1 to 5 percent slopes; about 3 miles northwest of Mesa Aparejo; 400 feet north and 2,165 feet east of the southwest corner of sec. 28, T. 6 N., R. 3 W.

A—0 to 2 inches; yellowish red (5YR 4/6) silt loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common medium and fine and few very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

C1—2 to 18 inches; yellowish red (5YR 5/6) silty clay loam, yellowish red (5YR 4/6) moist; massive; soft, very friable, slightly sticky and nonplastic; few medium, fine, and very fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—18 to 60 inches; yellowish red (5YR 5/6) silt loam, reddish brown (5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The soils generally are stratified with lenses of sandy or silty material less than 1 inch thick.

The A horizon is silt loam, clay loam, or clay. It has hue of 5YR or 2.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 4 to 6.

The C horizon is stratified silt loam, silty clay loam, clay loam, fine sandy loam, or sandy clay loam. The content of clay ranges from 18 to 35 percent, and the content of fine sand or coarser sand is more than 15 percent. This horizon has hue of 5YR or 2.5YR and value of 4 or 5 (3 or 4 moist).

Atarque Series

The soils in the Atarque series are classified as loamy, mixed, mesic Lithic Haplustalfs. These shallow and very shallow, well drained soils formed in eolian material derived mainly from sandstone. They are on mesa tops, knolls, cuestas, and hilltops. Slope is 1 to 10 percent. Elevation is 6,600 to 7,300 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 52 degrees F,

and the frost-free period is 115 to 135 days.

Typical pedon of Atarque fine sandy loam, in an area of Celacy-Atarque complex, 1 to 10 percent slopes; about 3.75 miles southeast of Broom Mountain; 725 feet west and 600 feet south of the northeast corner of sec. 27, T. 5 N., R. 7 W.

A—0 to 2 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few medium and fine roots; few very fine irregular pores; neutral; abrupt smooth boundary.

Bt1—2 to 9 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few medium and fine roots; common very fine and few fine irregular pores; few moderately thick clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—9 to 16 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; common fine and very fine irregular pores; common moderately thick clay films on faces of peds and in pores; neutral; abrupt smooth boundary.

2R—16 inches; sandstone.

The depth to bedrock is 8 to 20 inches. The soils are neutral or mildly alkaline throughout.

The A horizon has hue of 5YR or 7.5YR and value of 4 to 6 (3 to 5 moist). The Bt horizon is sandy clay loam or clay loam. It has hue of 5YR or 7.5YR and value of 4 or 5 (3 or 4 moist). The 2R horizon generally is sandstone, but in some areas it is basalt.

Bandera Series

The soils in the Bandera series are classified as loamy-skeletal over fragmental, mixed Entic Haploborolls. These deep, somewhat excessively drained soils formed in colluvium and windblown volcanic sediments. They are on cinder hills and cones. Slope is 15 to 45 percent. Elevation is 7,400 to 8,300 feet. The average annual precipitation is 16 to 20 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Bandera gravelly loam, in an area of Bandera association, 15 to 45 percent slopes; about 0.5 mile southeast of Bandera Crater; 2,200 feet east and 2,175 feet north of the southwest corner of sec. 23, T. 9 N., R. 12 W.

A1—0 to 4 inches; brown (10YR 4/3) gravelly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few coarse roots; common very fine and fine irregular pores; about 25 percent pebble-sized cinders; neutral; clear smooth boundary.

A2—4 to 9 inches; brown (10YR 5/3) gravelly loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine and fine irregular pores; about 30 percent pebble-sized cinders; neutral; clear smooth boundary.

C—9 to 16 inches; yellowish brown (10YR 5/6) very gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine and coarse roots; common very fine and fine irregular pores; about 40 percent pebble-sized cinders; neutral; abrupt wavy boundary.

2C—16 to 60 inches; cinders.

The A horizon is very gravelly or gravelly loam. It has value of 2 or 3 moist and chroma of 2 or 3. The C horizon has value of 4 or 5 (3 or 4 moist) and chroma of 3 to 6. The 2C horizon has more than 80 percent cinders to a depth of 60 inches.

Berto Series

The soils in the Berto series are classified as loamy, mixed, mesic Lithic Ustollic Haplargids. These shallow, well drained soils formed in mixed alluvium and windblown sediments. They are on mesa tops. Slope is 1 to 10 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Berto loam, in an area of Flaco-Berto loams, 0 to 5 percent slopes; about 2,110 feet west and 2,220 feet south of the northeast corner of sec. 28, T. 7 N., R. 3 W.

A—0 to 2 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; few very fine irregular pores; about 2 percent cobbles and 2 percent gravel; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bt1—2 to 6 inches; brown (7.5YR 5/4) loam, dark brown

(7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine irregular and few fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 2 percent cobbles and 2 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

Bt2—6 to 11 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; common very fine and fine irregular and few fine tubular pores; common thin clay films on faces of peds and in pores; about 2 percent cobbles and 2 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

Bk1—11 to 17 inches; pink (7.5YR 8/4) cobbly loam, light brown (7.5YR 6/4) moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; few very fine irregular pores; about 10 percent cobbles and 10 percent gravel; violently effervescent; disseminated calcium carbonate, many coarse irregular soft masses of calcium carbonate, and coatings of calcium carbonate on rock fragments; moderately alkaline; abrupt smooth boundary.

Bk2—17 to 18 inches; pink (7.5YR 8/4) loam, pink (7.5YR 7/4) moist; massive; hard, friable, slightly sticky and nonplastic; about 5 percent cobbles and 5 percent gravel; violently effervescent; disseminated calcium carbonate, many coarse irregular soft masses of calcium carbonate, and coatings of calcium carbonate on rock fragments; moderately alkaline; abrupt wavy boundary.

2R—18 inches; basalt.

The depth to bedrock is 10 to 20 inches.

The A horizon is cobbly loam or loam. It has hue of 7.5YR or 10YR, value of 4 or 5 (3 or 4 moist), and chroma of 3 or 4. The content of rock fragments ranges from 0 to 20 percent.

The Bt horizon is loam or clay loam. It has hue of 7.5YR or 10YR and value of 4 or 5 (3 or 4 moist). The content of rock fragments ranges from 0 to 10 percent.

The Bk horizon has hue of 7.5YR or 10YR, value of 6 to 8 (6 or 7 moist), and chroma of 4 or 5. The content of rock fragments ranges from 10 to 20 percent. The calcium carbonate equivalent is more than 15 percent.

Bond Series

The soils in the Bond series are classified as loamy, mixed, mesic Lithic Ustollic Haplargids. These shallow, well drained soils formed in eolian material derived dominantly from sandstone. They are on the upper slopes of cuestas and on the tops of hills, cuestas, mesas, and ridges. Slope is 2 to 20 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 115 to 150 days.

Typical pedon of Bond sandy loam, in an area of Bond-Penistaja-Rock outcrop complex, 2 to 15 percent slopes; about 300 feet south and 2,600 feet east of the northwest corner of sec. 8, T. 12 N., R. 10 W.

A—0 to 3 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few medium and fine roots; few very fine irregular pores; neutral; clear smooth boundary.

BA—3 to 7 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine irregular pores; neutral; abrupt smooth boundary.

Bt—7 to 13 inches; reddish brown (5YR 4/4) sandy clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; common moderately thick clay films on faces of peds and in pores; common very fine and few fine roots; common very fine and few fine tubular pores; neutral; abrupt smooth boundary.

C—13 to 16 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots; common very fine irregular pores; strongly effervescent; few fine irregular seams and filaments of calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—16 inches; sandstone.

The depth to bedrock ranges from 10 to 20 inches. Some pedons have a Cr horizon of weathered sandstone.

The A horizon has hue of 5YR or 7.5YR, value of 4 or 5 dry or moist, and chroma of 3 or 4. The Bt horizon is sandy clay loam or clay loam. It has hue of 5YR or 7.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 4 to 6. The C horizon is sandy loam, loam, clay loam, or

sandy clay loam. It has hue of 5YR or 7.5YR, value of 5 to 8 (5 or 6 moist), and chroma of 3 or 4 moist.

Borrego Series

The soils in the Borrego series are classified as clayey, mixed Lithic Eutroboralfs. These shallow, well drained soils formed in alluvium and windblown sediments. They are on basalt-capped mesas, ridges, and hills. Slope is 1 to 15 percent. Elevation is 7,200 to 8,200 feet. The average annual precipitation is 16 to 22 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Borrego gravelly loam, in an area of Cebolleta-Borrego-Rock outcrop complex, 1 to 15 percent slopes; about 138 feet northwest of Rancho Chupadero; long. 107 degrees 35 minutes 54 seconds W. and lat. 35 degrees 10 minutes 14 seconds N.

A—0 to 4 inches; brown (7.5YR 4/4) gravelly loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, very friable, slightly sticky and nonplastic; common fine and very fine roots; about 10 percent cobbles and 20 percent gravel; slightly acid; abrupt smooth boundary.

BA—4 to 8 inches; brown (7.5YR 4/4) gravelly clay loam, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots; few fine irregular and tubular pores; about 5 percent cobbles and 10 percent gravel; neutral; clear smooth boundary.

Bt1—8 to 13 inches; strong brown (7.5YR 4/6) gravelly clay, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common fine and very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and in pores; about 5 percent cobbles and 10 percent gravel; mildly alkaline; clear smooth boundary.

Bt2—13 to 18 inches; strong brown (7.5YR 4/6) gravelly clay, dark brown (7.5YR 4/4) moist; moderate medium angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and in pores; about 15 percent gravel; slightly effervescent; mildly alkaline; abrupt smooth boundary.

2R—18 inches; basalt.

The depth to bedrock is 10 to 20 inches.

The A horizon is gravelly loam or loam. The content of rock fragments ranges from 10 to 35 percent. This horizon has value of 4 or 5 (3 or 4 moist) and chroma of 2 or 4.

The content of rock fragments in the BA horizon ranges from 15 to 35 percent. This horizon has value of 4 or 5 (3 or 4 moist) and chroma of 2 or 4.

The Bt horizon is gravelly clay or clay. The content of rock fragments ranges from 5 to 35 percent. This horizon has value of 4 or 5 (3 or 4 moist) and chroma of 2 to 6.

The Borrego soils in this survey area are a taxadjunct to the series because they are underlain by basalt and are slightly effervescent and mildly alkaline in the lower part of the argillic horizon, directly above the basalt. These differences, however, do not significantly affect the use and management of the soils.

Cabezon Series

The soils in the Cabezon series are classified as clayey, montmorillonitic, mesic Lithic Argiustolls. These shallow, well drained soils formed in windblown sediments and alluvium over basalt. They are on hills and ridges. Slope is 1 to 45 percent. Elevation is 6,400 to 7,800 feet. The average annual precipitation is 12 to 16 inches. The average annual air temperature is 47 to 52 degrees F, and the frost-free period is 100 to 135 days.

Typical pedon of Cabezon very cobbly loam, in an area of Cabezon-Montecito-Rock outcrop association, 1 to 10 percent slopes; about 14 miles north of Techado; 2,100 feet west and 500 feet north of the southeast corner of sec. 2, T. 6 N., R. 15 W.

A—0 to 2 inches; brown (10YR 5/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; many very fine vesicular pores; about 2 percent stones, 25 percent cobbles, and 10 percent gravel; neutral; abrupt smooth boundary.

Bt1—2 to 10 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few coarse and common very fine roots; common very fine tubular and irregular pores; many moderately thick clay films on faces of peds and in pores; about 10 percent cobbles; mildly alkaline; clear smooth boundary.

Bt2—10 to 18 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few coarse and very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 5

percent cobbles and 5 percent gravel; mildly alkaline; abrupt smooth boundary.

2R—18 inches; basalt; thin coating of calcium carbonate at contact.

The depth to bedrock is 10 to 20 inches. Some pedons have a thin Bk horizon. The calcium carbonate equivalent in this horizon is less than 15 percent.

The A horizon is very cobbly loam or very cobbly sandy loam. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 or 3. The content of rock fragments ranges from 35 to 60 percent.

The Bt horizon is clay, sandy clay, or clay loam. It has value of 4 or 5. The content of rock fragments ranges from 10 to 25 percent.

Cantina Series

The soils in the Cantina series are classified as fine, mixed, mesic Aridic Argiustolls. These deep, well drained soils formed in mixed alluvium. They are in valleys between lava ridges and on hills. Slope is 1 to 3 percent. Elevation is 7,100 to 7,500 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Cantina sandy loam, in an area of Cabezon-Cantina complex, 1 to 7 percent slopes; about 1.5 miles northwest of Mujeres Camp; 1,800 feet south and 2,100 feet east of the northwest corner of sec. 16, T. 5 N., R. 14 W.

A—0 to 2 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist; moderate fine granular structure; slightly hard, friable, nonsticky and nonplastic; few coarse and common very fine roots; many fine vesicular pores; neutral; abrupt smooth boundary.

Bt1—2 to 9 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few coarse and common very fine roots; common very fine tubular and irregular pores; common moderately thick clay films on faces of peds and in pores; neutral; abrupt wavy boundary.

Bt2—9 to 16 inches; brown (10YR 4/3) sandy clay, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; few coarse and common very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt3—16 to 24 inches; brown (10YR 5/3) sandy clay, dark yellowish brown (10YR 4/4) moist; weak medium prismatic structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; few coarse and common very fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and in pores; slightly effervescent; mildly alkaline; clear smooth boundary.

Btk—24 to 31 inches; brown (10YR 5/3) sandy clay, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; common fine and very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; strongly effervescent; disseminated calcium carbonate and few medium irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bk—31 to 54 inches; brown (7.5YR 5/4) sandy clay loam, strong brown (7.5YR 4/6) moist; massive; hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate and few medium irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—54 inches; basalt.

The depth to bedrock ranges from 40 to 60 inches. The A horizon has value of 4 or 5 and chroma of 2 or 3. The Bk horizon is sandy clay loam or sandy clay. It has hue of 7.5YR or 10YR and value of 4 to 6 (4 or 5 moist). The calcium carbonate equivalent in this horizon is 2 to 10 percent.

Catman Series

The soils in the Catman series are classified as very fine, montmorillonitic, mesic Udorthentic Chromusterts. These deep, well drained soils formed in alluvium derived dominantly from shale. They are on flood plains, in swales, on alluvial fans, and in drainageways and valleys. Slope is 1 to 5 percent. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 12 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 135 days.

Typical pedon of Catman clay loam, in an area of Catman-Silkie association, 1 to 10 percent slopes; about 0.25 mile southeast of Crockett Peak; 560 feet north and 2,580 feet east of the southwest corner of sec. 28, T. 8 N., R. 17 W.

A—0 to 3 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; moderate medium granular structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; common fine irregular pores; cracks 1 to 3 centimeters wide; slightly effervescent; neutral; clear smooth boundary.

C1—3 to 32 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; very hard, very firm, very sticky and very plastic; common very fine and few fine roots; common very fine irregular pores; cracks 0.5 inch wide; many intersecting slickensides; slightly effervescent; neutral; clear smooth boundary.

C2—32 to 60 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; massive; very hard, very firm, sticky and plastic; few very fine roots; common very fine irregular pores; strongly effervescent; few fine irregular seams and filaments of calcium carbonate; mildly alkaline.

Cracks more than 0.5 inch wide extend to a depth of 32 inches. The A horizon is clay loam, sandy clay loam, or silty clay loam. It has hue of 10YR or 2.5Y, value of 4 to 7 (4 to 6 moist), and chroma of 3 or 4. The C horizon has hue of 10YR or 2.5Y, value of 4 to 7 (4 to 6 moist), and chroma of 3 or 4.

Catman Variant

The soils in the Catman Variant are classified as very fine, montmorillonitic (calcareous), mesic Mollic Ustifluvents. These deep, somewhat poorly drained soils formed in mixed alluvium. They are on alluvial fans and flood plains and in valleys. Slope is 1 to 3 percent. Elevation is 6,800 to 6,900 feet. The average annual precipitation is 13 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Catman Variant clay loam, 1 to 3 percent slopes; 300 feet south and 800 feet west of the northeast corner of sec. 3, T. 10 N., R. 16 W.

Ap—0 to 10 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; massive; hard, firm, sticky and plastic; common very fine and fine and few coarse roots; many very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C1—10 to 25 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; massive; very hard, very firm, very sticky and plastic; common very fine and fine and few coarse roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—25 to 33 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) moist; massive; very hard, very firm, very sticky and plastic; few very fine and fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C3—33 to 60 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; common medium distinct reddish yellow (7.5YR 6/8) mottles; massive; very hard, very firm, very sticky and plastic; few fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The water table in these soils fluctuates between depths of 24 and 40 inches. Electrical conductivity ranges from 8 to 16 millimhos per centimeter.

Cebolleta Series

The soils in the Cebolleta series are classified as clayey-skeletal, mixed Typic Argiborolls. These moderately deep, well drained soils formed in windblown sediments and alluvium. They are on hills, mountainsides, and mesas. Slope is 1 to 50 percent. Elevation is 7,500 to 9,400 feet. The average annual precipitation is 18 to 24 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free period is 80 to 110 days.

Typical pedon of Cebolleta cobbly loam, 2 to 10 percent slopes, very stony; about 0.75 mile west of Big Lake; long. 107 degrees 31 minutes 17 seconds W. and lat. 35 degrees 15 minutes 36 seconds N.

Oi—1 inch to 0; pine needles and oak leaves.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) cobbly loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few medium and common fine and very fine roots; few very fine pores; about 2 percent stones, 20 percent cobbles, and 5 percent gravel; slightly acid; abrupt smooth boundary.

BA—4 to 10 inches; dark grayish brown (10YR 4/2) very cobbly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and slightly plastic; common coarse, fine, and very fine roots; common very fine tubular pores; about 30 percent cobbles and 5 percent gravel; neutral; abrupt smooth boundary.

Bt1—10 to 19 inches; reddish brown (5YR 5/4) very cobbly clay, reddish brown (5YR 4/4) moist;

moderate medium subangular blocky structure; hard, friable, sticky and plastic; few coarse and common fine and very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 30 percent cobbles and 10 percent gravel; slightly acid; clear smooth boundary.

Bt2—19 to 25 inches; brown (7.5YR 4/4) very cobbly clay, dark brown (7.5YR 3/4) moist; strong medium angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 25 percent cobbles and 20 percent gravel; slightly acid; abrupt wavy boundary.

2R—25 inches; basalt.

The depth to bedrock, or to the base of the Bt horizon, is 20 to 40 inches. The thickness of the mollic epipedon is 8 to 15 inches.

The A horizon is cobbly or very cobbly loam. It has hue of 7.5YR or 10YR, value of 3 to 5 (2 or 3 moist), and chroma of 2 or 3. The content of rock fragments ranges from 25 to 45 percent, by volume, including 0 to 5 percent stones, 20 to 30 percent cobbles, and 5 to 10 percent gravel.

The BA horizon is very cobbly loam and very cobbly clay loam. It has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 or 3. The content of rock fragments ranges from 35 to 50 percent, by volume, including 0 to 5 percent stones, 30 to 35 percent cobbles, and 5 to 10 percent gravel.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5 (3 or 4 moist), and chroma of 2 to 4.

Celacy Series

The soils in the Celacy series are classified as fine-loamy, mixed, mesic Aridic Haplustalfs. These moderately deep, well drained soils formed in alluvium and eolian material derived dominantly from interbedded sandstone and shale. They are on mesa tops and cuestas. Slope is 1 to 5 percent. Elevation is 6,600 to 7,300 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 115 to 130 days.

Typical pedon of Celacy sandy loam, in an area of Celacy-Atarque complex, 1 to 10 percent slopes; about 3.75 miles east of Broom Mountain; 1,375 feet west and 500 feet north of the southeast corner of sec. 22, T. 5 N., R. 7 W.

A—0 to 2 inches; strong brown (7.5YR 5/6) sandy loam, strong brown (7.5YR 4/6) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few coarse, medium, and fine roots; few very fine irregular pores; mildly alkaline; abrupt smooth boundary.

Bt1—2 to 6 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few coarse, medium, fine, and very fine roots; common fine and very fine tubular pores; few thin clay films on faces of peds and in pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bt2—6 to 12 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; common fine and very fine roots; common fine and very fine tubular pores; common moderately thick clay films on faces of peds and in pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Bk—12 to 24 inches; reddish yellow (7.5YR 6/8) sandy clay loam, strong brown (7.5YR 5/8) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine irregular pores; violently effervescent; few fine irregular seams and filaments of calcium carbonate; mildly alkaline; abrupt smooth boundary.

2R—24 inches; sandstone.

The depth to bedrock is 20 to 40 inches, and depth to the base of the Bt horizon is 10 to 24 inches. The content of rock fragments ranges from 0 to 10 percent.

The Bt and Bk horizons are sandy clay loam or clay loam. The 2R horizon is sandstone or interbedded sandstone and shale.

Charo Series

The soils in the Charo series are classified as fine, mixed Typic Argiborolls. These moderately deep, well drained soils formed in windblown sediments and mixed alluvium. They are on ridges and hills, in swales, and on mesa tops. Slope is 0 to 5 percent. Elevation is 7,200 to 8,300 feet. The average annual precipitation is 16 to 20 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Charo loam, 0 to 5 percent slopes;

about 8 miles northeast of Bibo; long. 107 degrees 22 minutes 16 seconds W. and lat. 35 degrees 16 minutes 47 seconds N.

A—0 to 5 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine and many very fine roots; few fine irregular pores; neutral; abrupt smooth boundary.

Bt1—5 to 11 inches; reddish brown (5YR 4/3) clay loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; common fine and many very fine roots; few fine and very fine tubular pores; few thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—11 to 18 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate fine angular blocky structure; very hard, firm, sticky and plastic; few fine and many very fine roots; few fine and very fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt3—18 to 28 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate fine prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky and very plastic; common very fine roots; few fine and very fine tubular pores; many moderately thick clay films on faces of peds and in pores; mildly alkaline; abrupt wavy boundary.

2R—28 inches; basalt.

The depth to bedrock, or to the base of the Bt horizon, ranges from 20 to 40 inches. The thickness of the mollic epipedon is 8 to 13 inches.

The A horizon is loam or cobbly loam. It has hue of 10YR or 7.5YR and chroma of 2 or 3. The content of rock fragments ranges from 0 to 25 percent, by volume, including 0 to 15 percent cobbles and 0 to 10 percent gravel.

The Bt horizon has value of 4 or 5 (3 or 4 moist) and chroma of 3 to 6. The content of rock fragments ranges from 0 to 15 percent, by volume, including 0 to 10 percent cobbles and 0 to 5 percent gravel.

Cinnadale Series

The soils in the Cinnadale series are classified as loamy-skeletal, mixed, frigid Lithic Ustochrepts. These shallow, well drained soils formed in alluvium and windblown sediments derived dominantly from siltstone and sandstone. They are on ridges and hills. Slope is 1 to 15 percent. Elevation is 7,800 to 8,400 feet. The average annual precipitation is 20 to 24 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Cinnadale gravelly very fine sandy loam, 1 to 15 percent slopes; about 3 miles southeast of Page; 1,500 feet west and 1,800 feet south of the northeast corner of sec. 10, T. 12 N., R. 15 W.

Oi—1 inch to 0; partially decomposed pine needles.

A—0 to 4 inches; light reddish brown (5YR 6/3) gravelly very fine sandy loam, dark reddish brown (5YR 3/3) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; few very fine irregular pores; about 20 percent gravel; neutral; clear smooth boundary.

Bw—4 to 12 inches; light reddish brown (5YR 6/4) very channery loam, dark reddish brown (5YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; about 30 percent channers and 20 percent gravel; neutral; abrupt smooth boundary.

2R—12 inches; red sandstone.

The depth to bedrock is 10 to 20 inches. The content of clay ranges from 10 to 15 percent. In some pedons the upper few inches of the sandstone is weathered.

The A horizon has hue of 2.5YR or 5YR. It has 15 to 25 percent angular pebble-sized fragments. The B horizon has 20 to 30 percent angular pebble-sized fragments and 20 to 30 percent channers.

Clovis Series

The soils in the Clovis series are classified as fine-loamy, mixed, mesic Ustollic Haplargids. These deep, well drained soils formed in mixed alluvium and windblown sediments. They are on fan terraces. Slope is 1 to 3 percent. Elevation is 5,750 to 5,900 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 125 to 140 days.

Typical pedon of Clovis sandy clay loam, 1 to 3 percent slopes; about 0.5 mile southwest of Lady Lake, in New Laguna; 2,000 feet east and 1,200 feet south of the northwest corner of sec. 1, T. 9 N., R. 6 W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/6) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots; many very fine and common fine irregular pores; slightly effervescent;

disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Bt—8 to 21 inches; strong brown (7.5YR 4/6) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and slightly plastic; common very fine and few fine roots; few very fine and fine tubular pores; common moderately thick clay films on faces of peds and in pores; slightly effervescent; few fine irregular soft filaments of calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bk1—21 to 37 inches; pink (7.5YR 8/4) sandy clay loam, pink (7.5YR 7/4) moist; massive; hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine irregular pores; violently effervescent; many coarse irregular soft masses of calcium carbonate; strongly alkaline; clear smooth boundary.

Bk2—37 to 60 inches; pink (7.5YR 7/4) sandy clay loam, light brown (7.5YR 6/4) moist; massive; hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine irregular pores; violently effervescent; many coarse irregular soft masses of calcium carbonate; strongly alkaline.

The Clovis soils in this survey area are a taxadjunct to the series because they are slightly effervescent in the upper part. This difference, however, does not significantly affect the use and management of the soils.

Flaco Series

The soils in the Flaco series are classified as fine-loamy, mixed, mesic Ustollic Haplargids. These moderately deep, well drained soils formed in mixed alluvium and windblown sediments. They are on basalt-capped mesas. Slope is 0 to 10 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Flaco loam, in an area of Flaco-Berto loams, 0 to 5 percent slopes; on Mesa Lucero; 800 feet west and 1,060 feet north of the southeast corner of sec. 21, T. 6 N., R. 3 W.

A—0 to 2 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine irregular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

Bt—2 to 7 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; common very fine irregular pores; few thin clay films in pores; slightly effervescent; moderately alkaline; clear smooth boundary.

Btk—7 to 11 inches; yellowish brown (10YR 5/4) clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few fine and very fine roots; common fine and very fine irregular pores; common thin clay films on faces of peds and in pores; strongly effervescent; common medium irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bk1—11 to 16 inches; yellowish brown (10YR 5/6) clay loam, dark yellowish brown (10YR 4/6) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few fine irregular pores; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—16 to 29 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—29 inches; basalt that has a thin layer of partially cemented calcium carbonate.

The depth to bedrock is 20 to 40 inches. Depth to the base of the Bt horizon is 9 to 18 inches.

The A horizon is loam or cobbly loam. It has hue of 7.5YR or 10YR, value of 3 to 5 dry or moist, and chroma of 3 or 4. The content of rock fragments ranges from 0 to 20 percent.

The Bt horizon has hue of 7.5YR or 10YR and value of 4 or 5 (3 or 4 moist). The content of rock fragments ranges from 0 to 10 percent.

The Bk horizon is loam, clay loam, or gravelly loam. It has hue of 7.5YR or 10YR, value of 4 to 6 dry or moist, and chroma of 4 to 6. The content of rock fragments ranges from 0 to 20 percent. The calcium carbonate equivalent is more than 15 percent.

Flugle Series

The soils in the Flugle series are classified as fine-loamy, mixed, mesic Aridic Haplustalfs. These deep, well drained soils formed in wind-modified, mixed alluvium. They are on hills, ridges, fan terraces, and mesas. Slope is 1 to 8 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 12 to 14

inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 115 to 135 days.

Typical pedon of Flugle loamy fine sand, in an area of Flugle-Goesling loamy fine sands, 1 to 8 percent slopes; about 2.5 miles east of the intersection of the Cibola-Catron County line and the Arizona State line; 500 feet north and 120 feet west of the southeast corner of sec. 11, T. 4 N., R. 21 W.

A—0 to 5 inches; brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few very fine irregular pores; neutral; clear smooth boundary.

Bt1—5 to 18 inches; strong brown (7.5YR 4/6) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine and fine roots; common fine tubular pores; common thin clay films on faces of peds; neutral; gradual wavy boundary.

Bt2—18 to 27 inches; brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few medium and very fine roots; few fine tubular pores; few thin clay films on faces of peds and in pores; mildly alkaline; gradual wavy boundary.

Bk1—27 to 41 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Bk2—41 to 55 inches; pink (7.5YR 7/4) sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; strongly effervescent; few thin irregular seams and filaments of calcium carbonate; mildly alkaline; gradual smooth boundary.

Bk3—55 to 61 inches; pink (7.5YR 7/4) sandy loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; strongly effervescent; few thin irregular seams and filaments of calcium carbonate; mildly alkaline.

The depth to calcium carbonate is 20 to 30 inches. The calcium carbonate equivalent is less than 10 percent. The content of rock fragments ranges from 0 to 15 percent throughout the profile.

The A horizon is loamy fine sand or sandy loam. It has hue of 7.5YR or 10YR, value of 4 or 5 (3 or 4 moist), and chroma of 3 or 4. The Bt horizon is sandy clay loam, clay loam, or loam. It has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6 (3 to 5 moist), and chroma of 2 to 6. The Bk horizon is sandy clay loam, sandy loam, loam, fine sandy loam, or clay loam. It has hue of 7.5YR or 10YR, value of 5 to 7 (4 to 6 moist), and chroma of 3 to 6.

Galestina Series

The soils in the Galestina series are classified as fine, mixed, mesic Aridic Paleustalfs. These deep, well drained soils formed in alluvium derived from shale. They are on hillsides and mesa tops. Slope is 1 to 8 percent. Elevation is 6,800 to 7,500 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Galestina sandy loam, in an area of Nogal-Galestina sandy loams, 1 to 10 percent slopes; about 0.5 mile north of Ojo Pueblo Ruins; 2,160 feet east and 600 feet north of the southwest corner of sec. 21, T. 8 N., R. 16 W.

A—0 to 2 inches; yellowish brown (10YR 5/4) sandy loam, dark yellowish brown (10YR 4/4) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; common fine vesicular pores; neutral; abrupt smooth boundary.

BA—2 to 7 inches; yellowish brown (10YR 5/4) loam, dark yellowish brown (10YR 4/4) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common fine tubular and few fine vesicular pores; mildly alkaline; clear smooth boundary.

Bt1—7 to 24 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; moderate medium prismatic structure parting to strong medium angular blocky; very hard, very firm, very sticky and very plastic; common very fine and fine roots; common fine tubular pores; continuous thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt2—24 to 31 inches; yellowish brown (10YR 5/4) clay, yellowish brown (10YR 5/4) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and few fine roots; few fine tubular pores; many thick clay films on faces of peds and in pores; slightly effervescent; mildly alkaline; clear smooth boundary.

Bk1—31 to 42 inches; yellowish brown (10YR 5/8) clay,

yellowish brown (10YR 5/6) moist; massive; very hard, very firm, very sticky and very plastic; few very fine roots; common very fine irregular pores; strongly effervescent; few medium irregular soft masses of calcium carbonate; mildly alkaline; gradual smooth boundary.

Bk2—42 to 46 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine irregular pores; strongly effervescent; common medium irregular soft masses of calcium carbonate; mildly alkaline; clear wavy boundary.

Cr—46 to 60 inches; shale.

Depth to the Cr horizon is 40 to 60 inches. Depth to the base of the Bt horizon is 12 to 35 inches.

The Bt horizon is clay or clay loam. The calcium carbonate equivalent in the Bk horizon is less than 5 percent. The Cr horizon is dominantly shale and some interbedded sandstone.

Glenberg Series

The soils in the Glenberg series are classified as coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents. These deep, well drained soils formed in alluvium derived dominantly from sandstone. They are on flood plains and alluvial fans. Slope is 0 to 2 percent. Elevation is 6,200 to 6,600 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 110 to 140 days.

Typical pedon of Glenberg sandy loam, in an area of Glenberg-San Mateo complex, 0 to 2 percent slopes; about 0.5 mile northwest of Milan; 600 feet east and 2,400 feet south of the northwest corner of sec. 4, T. 11 N., R. 10 W.

A—0 to 11 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; few very fine irregular pores; slightly effervescent; mildly alkaline; abrupt smooth boundary.

C1—11 to 21 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; few very fine irregular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

C2—21 to 60 inches; pale brown (10YR 6/3) sandy loam stratified with thin lenses of loam and loamy sand; brown (10YR 5/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Goesling Series

The soils in the Goesling series are classified as fine-loamy, mixed, mesic Aridic Haplustalfs. These deep, well drained soils formed in wind-modified, mixed alluvium. They are on mesas, fan terraces, hills, and ridges. Slope is 1 to 8 percent. Elevation is 6,000 to 6,800 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 115 to 135 days.

Typical pedon of Goesling loamy fine sand, in an area of Flugle-Goesling loamy fine sands, 1 to 8 percent slopes; about 6 miles northeast of the intersection of the southern Cibola County line and the Arizona State line; 400 feet south and 1,580 feet east of the northwest corner of sec. 8, T. 4 N., R. 20 W.

A—0 to 5 inches; light yellowish brown (10YR 6/4) loamy fine sand, dark yellowish brown (10YR 3/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; few very fine irregular pores; about 10 percent gravel; neutral; abrupt smooth boundary.

Bt1—5 to 10 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine, fine, and medium roots; common fine tubular pores; few thin clay films on faces of peds and in pores; about 5 percent gravel; neutral; clear wavy boundary.

Bt2—10 to 18 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; hard, friable, sticky and slightly plastic; common fine and very fine roots; few fine tubular pores; few thin clay films on faces of peds and in pores; about 5 percent gravel; mildly alkaline; clear wavy boundary.

Bk1—18 to 25 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine irregular pores; about 5 percent cobbles and 5 percent gravel; violently effervescent; many coarse irregular soft masses of calcium carbonate; mildly alkaline; clear wavy boundary.

Bk2—25 to 46 inches; white (10YR 8/2) loam, very pale brown (10YR 7/4) moist; massive; slightly hard,

friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; about 5 percent gravel; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

Bk3—46 to 60 inches; very pale brown (10YR 7/3) sandy loam, yellowish brown (10YR 5/4) moist; massive; loose, very friable, nonsticky and nonplastic; few very fine roots; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline.

Depth to the Bk horizon is 15 to 20 inches. The calcium carbonate equivalent is 15 to 30 percent.

The Bt horizon is sandy clay loam or clay loam. The Bk horizon is loam, sandy loam, or sandy clay loam.

Grieta Series

The soils in the Grieta series are classified as fine-loamy, mixed, mesic Typic Haplargids. These deep, well drained soils formed in wind-modified, mixed alluvium. They are on fan terraces, hills, and ridges and in interdune areas. Slope is 1 to 10 percent. Elevation is 5,400 to 6,100 feet. The average annual precipitation is 7 to 10 inches. The average annual air temperature is 51 to 55 degrees F, and the frost-free period is 140 to 165 days.

Typical pedon of Grieta sandy loam, in an area of Grieta-Shiprock association, 1 to 10 percent slopes; about 3.75 miles west of Suwanee; 420 feet east and 1,050 feet south of the northwest corner of sec. 7, T. 8 N., R. 3 W.

A—0 to 3 inches; strong brown (7.5YR 5/6) sandy loam, brown (7.5YR 4/4) moist; soft, very friable, nonsticky and nonplastic; many fine and few very fine roots; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

AB—3 to 8 inches; strong brown (7.5YR 5/6) sandy loam, strong brown (7.5YR 4/6) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bt1—8 to 16 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine roots; few very fine tubular pores; common thin clay films on faces of peds; mildly alkaline; clear smooth boundary.

Bt2—16 to 28 inches; strong brown (7.5YR 5/6) sandy clay loam, brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine tubular pores; few thin clay films on faces of peds and in pores; mildly alkaline; abrupt smooth boundary.

Bk1—28 to 42 inches; pink (7.5YR 8/4) sandy loam, light brown (7.5YR 6/4) moist; massive; hard, friable, slightly sticky and nonplastic; few fine roots; few fine irregular pores; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—42 to 60 inches; pinkish white (7.5YR 8/2) sandy loam, pink (7.5YR 7/4) moist; massive; hard, friable, slightly sticky and nonplastic; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline.

Depth to the base of the Bt horizon is 20 to 34 inches. The calcium carbonate equivalent in the Bk horizon is more than 15 percent.

The A horizon has hue of 5YR or 7.5YR, value of 5 or 6 (4 or 5 moist), and chroma of 4 to 6. The content of rock fragments ranges from 0 to 10 percent.

The Bt horizon is sandy clay loam or clay loam. It has hue of 5YR or 7.5YR, value of 5 or 6 (4 or 5 moist), and chroma of 4 to 6.

The Bk horizon is sandy clay loam or sandy loam. It has hue of 5YR or 7.5YR, value of 5 to 8 (5 to 7 moist), and chroma of 2 to 6. The content of rock fragments ranges from 0 to 10 percent.

Hackroy Series

The soils in the Hackroy series are classified as clayey, mixed, mesic Lithic Haplustalfs. These shallow, well drained soils formed in alluvium and windblown sediments. They are on the tops of basalt-capped mesas and on plateaus. Slope is 1 to 5 percent. Elevation is 7,000 to 8,000 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 52 degrees F, and the frost-free period is 110 to 130 days.

Typical pedon of Hackroy cobbly loam, in an area of Paguate-Hackroy complex, 1 to 5 percent slopes; at the top of Chicken Mountain; 900 feet north and 980 feet west of the southeast corner of sec. 19, T. 5 N., R. 4 W.

A—0 to 3 inches; brown (7.5YR 5/4) cobbly loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; slightly hard, very friable, nonsticky and slightly plastic; many very fine roots; common fine

irregular pores; about 15 percent cobbles; mildly alkaline; abrupt smooth boundary.

Bt1—3 to 11 inches; reddish brown (5YR 5/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, firm, sticky and plastic; few fine and common very fine roots; common fine tubular pores; many thick clay films on faces of peds and in pores; about 10 percent cobbles; mildly alkaline; clear smooth boundary.

Bt2—11 to 14 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 10 percent cobbles; mildly alkaline; abrupt smooth boundary.

2R—14 inches; basalt.

The depth to bedrock is 10 to 20 inches. The content of rock fragments in the A horizon ranges from 15 to 20 percent. The Bt horizon is clay loam or clay. It has 35 to 50 percent clay and 0 to 15 percent rock fragments.

Hagerman Series

The soils in the Hagerman series are classified as fine-loamy, mixed, mesic Ustollic Haplargids. These moderately deep, well drained soils formed in eolian material and alluvium derived dominantly from sandstone. They are on hills, ridges, mesas, and cuestas. Slope is 1 to 5 percent. Elevation is 6,000 to 7,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Hagerman fine sandy loam, in an area of Hagerman-Bond association, 1 to 10 percent slopes; about 3 miles east of Bibo; long. 107 degrees 16 minutes 11 seconds W. and lat. 35 degrees 11 minutes 10 seconds N.

A—0 to 3 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 3/4) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; few very fine irregular pores; mildly alkaline; abrupt smooth boundary.

AB—3 to 6 inches; dark brown (7.5YR 4/4) fine sandy loam, dark brown (7.5YR 4/6) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; few fine and common very fine tubular pores; mildly alkaline; abrupt smooth boundary.

Bt—6 to 23 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; few fine and very fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; abrupt smooth boundary.

Bk—23 to 34 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; few very fine irregular pores; strongly effervescent; few medium irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—34 inches; sandstone.

The depth to sandstone is 20 to 40 inches. Depth to the base of the Bt horizon is 12 to 25 inches.

The Bt horizon is sandy clay loam or clay loam. The Bk horizon is sandy clay loam or sandy loam. It has a calcium carbonate equivalent of 3 to 10 percent.

Harvey Series

The soils in the Harvey series are classified as fine-loamy, mixed, mesic Ustollic Calciorthids. These deep, well drained soils formed in alluvium and windblown sediments derived dominantly from limestone. They are on fan terraces and mesa tops. Slope is 1 to 5 percent. Elevation is 6,000 to 6,500 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Harvey loam, in an area of Harvey-Oelop association, 0 to 5 percent slopes; about 2 miles northeast of Lucero Windmill; 1,700 feet east and 400 feet north of the southwest corner of sec. 34, T. 8 N., R. 3 W.

A—0 to 2 inches; brown (7.5YR 5/4) loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and medium roots; few fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Bw1—2 to 10 inches; reddish yellow (7.5YR 6/6) clay loam, strong brown (7.5YR 5/6) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine and common fine and medium roots; few very fine irregular pores; strongly effervescent; few medium irregular seams and filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

Bw2—10 to 18 inches; light brown (7.5YR 6/4) clay

loam, brown (7.5YR 5/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots; few very fine irregular pores; strongly effervescent; few medium irregular soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

Bk1—18 to 21 inches; pink (7.5YR 7/4) loam, light brown (7.5YR 6/4) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic: common fine and few medium roots; few very fine irregular pores; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

Bk2—21 to 31 inches; pink (7.5YR 8/4) loam, pink (7.5YR 8/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; common fine and few medium roots; few very fine irregular pores; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline; clear wavy boundary.

Bk3—31 to 60 inches; pink (7.5YR 8/4) loam, pink (7.5YR 8/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few fine and medium roots; few very fine irregular pores; violently effervescent; many coarse irregular soft masses of calcium carbonate; moderately alkaline.

The content of rock fragments ranges from 0 to 15 percent throughout the profile. The Bw and Bk horizons are loam or clay loam.

Hickman Series

The soils in the Hickman series are classified as fine-loamy, mixed (calcareous), mesic Typic Ustifluvents. These deep, well drained soils formed in mixed alluvium. They are on flood plains and alluvial fans and in valleys. Slope is 1 to 6 percent. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 12 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 135 days.

Typical pedon of Hickman loam, in an area of Hickman-Catman complex, 1 to 6 percent slopes; about 1.5 miles north of the intersection of the Cibola-Catron County line and the Arizona State line; 1,056 feet west and 2,112 feet south of the northeast corner of sec. 4, T. 4 N., R. 21 W.

A—0 to 4 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate thin platy structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C1—4 to 32 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and few very fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—32 to 52 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; about 10 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C3—52 to 60 inches; light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few very fine irregular pores; about 5 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The content of rock fragments ranges from 0 to 15 percent throughout the profile.

The A horizon is loam or sandy clay loam. It has hue of 10YR or 2.5Y, value of 5 or 6 (4 or 5 moist), and chroma of 3 or 4.

The C horizon is clay loam, loam, sandy clay loam, silty clay loam, or sandy loam. The content of clay ranges from 18 to 35 percent. This horizon has hue of 10YR or 2.5Y, value of 4 to 6 (3 to 5 moist), and chroma of 3 to 6.

Ildefonso Series

The soils in the Ildefonso series are classified as loamy-skeletal, mixed, mesic Ustollic Calciorthids. These deep, well drained soils formed in mixed alluvium. They are on ridges and fan terraces. Slope is 3 to 15 percent. Elevation is 5,900 to 6,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 150 days.

Typical pedon of Ildefonso very gravelly sandy loam, 3 to 15 percent slopes; about 1.5 miles north of Ponia Canyon; 2,600 feet east and 50 feet south of the northwest corner of sec. 5, T. 7 N., R. 4 W.

A—0 to 3 inches; brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable, nonsticky

and nonplastic; few very fine and fine roots; common fine irregular pores; about 5 percent cobbles and 35 percent gravel; slightly effervescent; mildly alkaline; clear smooth boundary.

Bw—3 to 8 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few very fine and fine roots; common fine irregular pores; about 10 percent cobbles and 30 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bk1—8 to 16 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; common fine irregular pores; about 10 percent cobbles and 28 percent gravel; violently effervescent; common fine irregular soft masses and seams of calcium carbonate; moderately alkaline; gradual smooth boundary.

Bk2—16 to 60 inches; pink (7.5YR 7/4) very gravelly loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; common fine irregular pores; about 10 percent cobbles and 28 percent gravel; violently effervescent; many medium irregular soft masses of calcium carbonate; strongly alkaline.

The content of rock fragments ranges from 35 to 60 percent throughout the profile. The calcium carbonate equivalent ranges from 15 to 30 percent.

The Ildefonso soils in this survey area have more clay in the particle-size control section than is defined as the range for the series. This difference, however, does not significantly affect the use and management of the soils.

Kenray Series

The soils in the Kenray series are classified as mixed, frigid Typic Ustipsamments. These deep, excessively drained soils formed in eolian material derived dominantly from sandstone. They are on dunes, hills, and mesas. Slope is 3 to 15 percent. Elevation is 7,300 to 8,000 feet. The average annual precipitation is 16 to 20 inches. The average annual air temperature is 43 to 45 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Kenray fine sand, 3 to 15 percent slopes; about 20 miles south of Grants; 1,740 feet west and 360 feet north of the southeast corner of sec. 2, T. 7 N., R. 10 W.

A1—0 to 5 inches; brown (10YR 5/3) fine sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common fine and very fine roots; common fine irregular pores; neutral; clear smooth boundary.

A2—5 to 15 inches; brown (10YR 5/3) fine sand, dark brown (10YR 4/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine and medium roots; common fine irregular pores; neutral; clear smooth boundary.

C1—15 to 32 inches; light yellowish brown (10YR 6/4) loamy sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common fine irregular pores; neutral; gradual wavy boundary.

C2—32 to 60 inches; brownish yellow (10YR 6/6) loamy sand, yellowish brown (10YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common fine irregular pores; neutral.

The C horizon is loamy sand, fine sand, or sand.

Kiki Series

The soils in the Kiki series are classified as fine-loamy, mixed, mesic Typic Haplargids. These moderately deep, well drained soils formed in eolian material and alluvium derived dominantly from sandstone. They are on knolls and ridges. Slope is 3 to 15 percent. Elevation is 5,500 to 6,000 feet. The average annual precipitation is 7 to 10 inches. The average annual air temperature is 51 to 55 degrees F, and the frost-free period is 140 to 165 days.

Typical pedon of Kiki sandy loam, in an area of Grieta-Kiki sandy loams, 3 to 15 percent slopes; about 2 miles west of Suwanee; 2,000 feet east and 2,100 feet north of the southwest corner of sec. 6, T. 8 N., R. 3 W.

A1—0 to 3 inches; strong brown (7.5YR 5/6) sandy loam, strong brown (7.5YR 4/6) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and few medium roots; few very fine irregular pores; mildly alkaline; clear smooth boundary.

A2—3 to 6 inches; strong brown (7.5YR 5/6) sandy loam, strong brown (7.5YR 4/6) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine, common fine, and few medium roots; few fine irregular pores; mildly alkaline; abrupt smooth boundary.

Bt—6 to 14 inches; yellowish red (5YR 4/6) sandy clay loam, yellowish red (5YR 4/6) moist; strong medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; few very fine and fine tubular pores; common thin clay films on faces of

peds and in pores; mildly alkaline; clear smooth boundary.

Bw—14 to 19 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine irregular pores; mildly alkaline; abrupt smooth boundary.

Bk—19 to 24 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; violently effervescent; common medium irregular soft masses of calcium carbonate; mildly alkaline; abrupt smooth boundary.

2R—24 inches; basalt.

The depth to bedrock is 20 to 40 inches. The depth to an accumulation of calcium carbonate is 15 to 25 inches.

The content of rock fragments in the A horizon ranges from 0 to 15 percent. The Bt horizon is sandy clay loam or clay loam. The Bk horizon is sandy clay loam, clay loam, or loam. The calcium carbonate equivalent in this horizon is less than 15 percent.

Laporte Series

The soils in the Laporte series are classified as loamy, carbonatic, mesic Lithic Haplustolls. These shallow, well drained soils formed in mixed colluvium and windblown sediments. They are on hills and ridges. Slope is 3 to 60 percent. Elevation is 6,650 to 7,500 feet. The average annual precipitation is 12 to 15 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 110 to 135 days.

Typical pedon of Laporte gravelly loam, in an area of Laporte-Rock outcrop complex, 3 to 20 percent slopes; about 2 miles west of Bluewater Lake; 400 feet east and 750 feet south of the northwest corner of sec. 18, T. 12 N., R. 12 W.

A—0 to 3 inches; dark brown (10YR 4/3) gravelly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common fine irregular pores; strongly effervescent; disseminated calcium carbonate and few fine irregular soft masses of calcium carbonate; about 25 percent gravel; mildly alkaline; abrupt smooth boundary.

C—3 to 11 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common fine irregular pores; strongly effervescent; disseminated calcium carbonate and few fine irregular soft masses of calcium carbonate; about 20 percent gravel; moderately alkaline; abrupt smooth boundary.

2R—11 inches; limestone.

The depth to bedrock ranges from 10 to 20 inches. The A horizon is gravelly or very cobbly loam. It has value of 4 or 5 and chroma of 2 or 3. The C horizon has value of 4 or 5 (3 or 4 moist) and chroma of 2 or 3. In some pedons the 2R horizon is fractured in the upper few inches.

Loarc Series

The soils in the Loarc series are classified as fine-loamy, mixed, mesic Aridic Argiustolls. These deep, well drained soils formed in mixed alluvium. They are on fan terraces, hills, and mesas. Slope is 0 to 10 percent. Elevation is 7,200 to 7,800 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Loarc fine sandy loam, in an area of Millpaw-Loarc complex, 0 to 10 percent slopes; about 0.5 mile south of the Ponderosa Ranch House; 2,100 feet west and 300 feet north of the southeast corner of sec. 26, T. 5 N., R. 15 W.

A—0 to 4 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; common very fine irregular pores; neutral; clear smooth boundary.

Bt1—4 to 10 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; common very fine irregular pores; few thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—10 to 17 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine and very fine roots; few fine tubular pores; common moderately thick clay films on faces of peds and in pores; neutral; clear wavy boundary.

Bt3—17 to 31 inches; dark yellowish brown (10YR 4/4) sandy clay loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; hard,

friable, slightly sticky and slightly plastic; few very fine roots; common very fine irregular pores; few thin clay films on faces of peds and in pores; mildly alkaline; abrupt smooth boundary.

Bk—31 to 60 inches; yellowish brown (10YR 5/6) sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine irregular pores; strongly effervescent; few fine irregular seams and filaments of calcium carbonate; mildly alkaline.

The mollic epipedon ranges from 10 to 19 inches in thickness. Depth to the Bk horizon ranges from 25 to 50 inches. The calcium carbonate equivalent in this horizon is less than 15 percent.

Manzano Series

The soils in the Manzano series are classified as fine-loamy, mixed, mesic Cumulic Haplustolls. These deep, well drained soils formed in mixed alluvium. They are on alluvial fans. Slope is 1 to 5 percent. Elevation is 6,500 to 7,300 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 115 to 135 days.

Typical pedon of Manzano loam, 1 to 5 percent slopes; about 1 mile southwest of the Grants-Milan Airport; 800 feet west and 1,700 feet north of the southeast corner of sec. 29, T. 11 N., R. 10 W.

A—0 to 4 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common fine irregular pores; slightly effervescent; mildly alkaline; abrupt smooth boundary.

Bw—4 to 22 inches; brown (10YR 4/3) silt loam, dark brown (10YR 3/3) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; common fine tubular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bk1—22 to 49 inches; brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; common fine irregular pores; violently effervescent; common medium irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—49 to 60 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; strongly effervescent; common medium irregular soft masses of calcium carbonate; moderately alkaline.

The thickness of the mollic epipedon ranges from 20 to 30 inches. The Bw horizon is silt loam, loam, or clay loam. The Bk horizon is loam or clay loam. The calcium carbonate equivalent in this horizon is less than 15 percent.

The Manzano soils in this survey area have more calcium carbonate in the upper 22 inches than is defined as the range for the series. This difference, however, does not significantly affect the use and management of the soils.

McGaffey Series

The soils in the McGaffey series are classified as fine-loamy, mixed Cumulic Haploborolls. These deep, well drained soils formed in mixed alluvium. They are on fan terraces and valley floors. Slope is 1 to 5 percent. Elevation is 7,500 to 8,500 feet. The average annual precipitation is 18 to 22 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 90 to 105 days.

Typical pedon of McGaffey loam, 1 to 5 percent slopes; about 5 miles west of the Ice Caves; 2,300 feet south and 800 feet west of the northeast corner of sec. 12, T. 9 N., R. 13 W.

A—0 to 3 inches; reddish brown (5YR 5/3) loam, dark reddish brown (5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common fine irregular pores; neutral; abrupt smooth boundary.

Bw1—3 to 14 inches; reddish brown (5YR 5/3) loam, dark reddish brown (5YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine roots; few fine tubular pores; neutral; clear smooth boundary.

Bw2—14 to 23 inches; reddish brown (5YR 5/3) clay loam, dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and few fine roots; common very fine irregular pores; mildly alkaline; abrupt smooth boundary.

Bk—23 to 33 inches; reddish brown (5YR 4/3) loam, dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine and fine roots; common fine tubular pores; strongly

effervescent; common fine irregular filaments, threads, and soft masses of calcium carbonate; mildly alkaline; clear smooth boundary.

C1—33 to 45 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; common fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C2—45 to 60 inches; reddish yellow (5YR 6/6) loam, yellowish red (5YR 5/6) moist; massive; slightly hard, slightly sticky and nonplastic; few very fine roots; common fine irregular pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline.

The mollic epipedon ranges from 18 to 35 inches in thickness. The calcium carbonate equivalent in the Bk horizon is less than 7 percent. The C horizon is loam or clay loam.

Mespun Series

The soils in the Mespun series are classified as mixed, mesic Ustic Torripsamments. These deep, excessively drained soils formed in eolian material derived dominantly from sandstone. They are on dunes and ridges. Slope is 1 to 12 percent. Elevation is 5,900 to 7,100 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Mespun fine sand, in an area of Mespun-Palma association, 1 to 12 percent slopes; about 1 mile south of the old Roundy Ranch House; 1,300 feet west and 1,100 feet north of the southeast corner of sec. 17, T. 12 N., R. 9 W.

A—0 to 2 inches; yellowish brown (10YR 5/6) fine sand, dark yellowish brown (10YR 4/6) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine roots; common very fine irregular pores; mildly alkaline; abrupt smooth boundary.

C1—2 to 15 inches; reddish yellow (7.5YR 7/6) loamy fine sand, strong brown (7.5YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine irregular pores; mildly alkaline; clear smooth boundary.

C2—15 to 29 inches; reddish yellow (7.5YR 7/6) loamy fine sand, strong brown (7.5YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine irregular pores; mildly alkaline; gradual smooth boundary.

C3—29 to 60 inches; reddish yellow (7.5YR 6/6) fine sand, strong brown (7.5YR 5/6) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; common very fine irregular pores; mildly alkaline.

The A horizon is loamy sand or fine sand. The C horizon is fine sand, loamy sand, or loamy fine sand. It has hue of 5YR or 7.5YR, value of 5 to 7 (4 to 6 moist), and chroma of 5 or 6.

Microy Series

The soils in the Microy series are classified as fine, mixed Typic Argiborolls. These moderately deep, well drained soils formed in mixed alluvium. They are on hills. Slope is 5 to 30 percent. Elevation is 8,000 to 8,900 feet. The average annual precipitation is 18 to 22 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 90 to 100 days.

Typical pedon of Microy cobbly loam, in an area of Microy-Rock outcrop complex, 5 to 30 percent slopes; about 100 feet southwest of the summit of Cerro Redondo; long. 107 degrees 29 minutes 36 seconds W. and lat. 35 degrees 17 minutes 39 seconds N.

A—0 to 3 inches; brown (7.5YR 4/2) cobbly loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; few medium and common fine roots; many very fine irregular pores; about 15 percent cobble-sized and 10 percent pebble-sized cinders; neutral; abrupt smooth boundary.

Bt1—3 to 12 inches; dark reddish gray (5YR 4/2) cobbly clay, dark reddish brown (5YR 3/2) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and plastic; few coarse and common medium and fine roots; many very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 15 percent cobble-sized and 15 percent pebble-sized cinders; neutral; clear smooth boundary.

Bt2—12 to 28 inches; reddish brown (5YR 4/3) cobbly clay, dark reddish brown (5YR 4/3) moist; strong medium prismatic structure parting to strong medium angular blocky; very hard, firm, very sticky and plastic; few coarse and very fine roots; common very fine tubular pores; many thick clay films on faces of peds and in pores; about 15 percent cobble-sized and 15 percent pebble-sized cinders; mildly alkaline; clear wavy boundary.

C—28 to 36 inches; reddish brown (5YR 4/3) very cobbly clay, reddish brown (5YR 4/3) moist; massive; very hard, firm, very sticky and plastic; few medium and very fine roots; few very fine irregular

pores; about 20 percent cobble-sized and 20 percent pebble-sized cinders; mildly alkaline; abrupt wavy boundary.
2R—36 inches; basalt.

The depth to bedrock ranges from 20 to 40 inches. The mollic epipedon ranges from 9 to 15 inches in thickness. Depth to the base of the Bt horizon ranges from 14 to 31 inches.

The A horizon has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 2 or 3. The content of rock fragments ranges from 15 to 35 percent, by volume, including 10 to 20 percent cobble-sized and 5 to 15 percent pebble-sized cinders.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 2 to 4. The content of rock fragments ranges from 15 to 35 percent, by volume, including 10 to 20 percent cobble-sized and 5 to 15 percent pebble-sized cinders.

The C horizon has hue of 5YR or 2.5YR. The content of rock fragments ranges from 20 to 40 percent, by volume, including 20 percent cobble-sized and 0 to 20 percent pebble-sized cinders.

Mikim Series

The soils in the Mikim soils are classified as fine-loamy, mixed (calcareous), mesic Ustic Torriorthents. These deep, well drained soils formed in mixed alluvium. They are on fan terraces and valley sides. Slope is 1 to 5 percent. Elevation is 5,800 to 6,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 51 to 53 degrees F, and the frost-free period is 120 to 150 days.

Typical pedon of Mikim loam, 1 to 5 percent slopes; about 1 mile south of Casa Blanca; 1,900 feet east and 2,360 feet north of the southwest corner of sec. 9, T. 9 N., R. 6 W.

A—0 to 4 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common fine and very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.
C1—4 to 11 inches; pale brown (10YR 6/3) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots; common fine and very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
C2—11 to 25 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine and few medium roots; few fine and very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
C3—25 to 42 inches; very pale brown (10YR 7/3) clay loam, brown (10YR 5/3) moist; massive; hard, friable, sticky and slightly plastic; few very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.
C4—42 to 60 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, slightly sticky and nonplastic; few very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Millpaw Series

The soils in the Millpaw series are classified as fine, mixed, mesic Pachic Argiustolls. These deep, well drained soils formed in mixed alluvium. They are in valleys and swales and on mesas. Slope is 0 to 5 percent. Elevation is 7,000 to 7,800 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Millpaw loam, 0 to 5 percent slopes; about 1.5 miles west of the Towner Ranch House; 500 feet east and 160 feet south of the northwest corner of sec. 31, T. 5 N., R. 15 W.

A—0 to 3 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; common fine vesicular pores; mildly alkaline; abrupt smooth boundary.
BA—3 to 8 inches; dark brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; few very fine irregular pores; mildly alkaline; abrupt smooth boundary.
Bt1—8 to 19 inches; dark brown (10YR 4/3) clay, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, friable, sticky and plastic; few fine and common very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.
Bt2—19 to 29 inches; dark brown (10YR 4/3) clay, very dark grayish brown (10YR 3/2) moist; weak medium

subangular blocky structure; hard, friable, sticky and slightly plastic; few fine and common very fine roots; common very fine tubular pores; common thin clay films on faces of peds and in pores; mildly alkaline; abrupt smooth boundary.

Bt3—29 to 41 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine irregular pores; few thin clay films in pores; slightly effervescent; mildly alkaline; abrupt smooth boundary.

Bk—41 to 60 inches; brownish yellow (10YR 6/6) sandy clay loam, yellowish brown (10YR 5/6) moist; massive; hard, friable, sticky and slightly plastic; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate and few small irregular soft masses of calcium carbonate; moderately alkaline.

The mollic epipedon ranges from 20 to 35 inches in thickness. The Bt horizon is clay or sandy clay in the upper part and sandy clay loam in the lower part. It has value of 4 or 5 (3 or 4 moist) and chroma of 2 or 3. The Bk horizon has hue of 10YR or 7.5YR, value of 5 or 6 (4 or 5 moist), and chroma of 4 to 6.

Mion Series

The soils in the Mion series are classified as clayey, mixed (calcareous), mesic, shallow Ustic Torriorthents. These shallow, well drained soils formed in colluvium and alluvium derived dominantly from shale. They are on hills, benches, and ridges. Slope is 3 to 65 percent. Elevation is 5,800 to 7,400 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 49 to 54 degrees F, and the average frost-free period is 115 to 160 days.

Typical pedon of Mion stony loam, in an area of Rock outcrop-Mion complex, 15 to 65 percent slopes; about 1 mile south of Sky City; 400 feet east and 1,700 feet north of the southwest corner of sec. 31, T. 8 N., R. 7 W.

A—0 to 3 inches; light olive brown (2.5Y 5/4) stony loam, olive brown (2.5Y 4/4) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; few fine and very fine roots; common fine irregular pores; about 10 percent stones, 5 percent cobbles, and 10 percent gravel; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C1—3 to 8 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; few fine and very fine roots; few very fine irregular pores; about 5 percent gravel; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C2—8 to 13 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, slightly sticky and plastic; few fine and very fine roots; few very fine irregular pores; about 5 percent gravel; slightly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

2Cr—13 to 60 inches; grayish brown (2.5YR 5/2) shale.

The depth to shale ranges from 10 to 20 inches. The soils are mildly alkaline or moderately alkaline throughout. The content of rock fragments ranges from 0 to 35 percent.

The A horizon is stony loam or loam. It has hue of 10YR or 2.5Y, value of 4 to 6 (3 or 4 moist), and chroma of 2 to 4. The C horizon is clay, silty clay loam, or silty clay. It has hue of 10YR or 2.5Y, value of 4 to 6 (3 to 5 moist), and chroma of 2 to 6.

Mirabal Series

The soils in the Mirabal series are classified as loamy-skeletal, mixed, nonacid, frigid Typic Ustorthents. These moderately deep, well drained soils formed in mixed alluvium and windblown sediments. They are on hills. Slope is 2 to 15 percent. Elevation is 8,100 to 8,800 feet. The average annual precipitation is 20 to 24 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 85 to 105 days.

Typical pedon of Mirabal very gravelly loam, 2 to 15 percent slopes; about 1.5 miles southwest of Lookout Mountain; 1,550 feet east and 2,350 feet south of the northwest corner of sec. 10, T. 11 N., R. 14 W.

A—0 to 3 inches; brown (7.5YR 5/4) very gravelly loam, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and few very fine and medium roots; common fine and very fine tubular pores; about 5 percent cobbles and 40 percent gravel; slightly acid; abrupt smooth boundary.

C1—3 to 14 inches; light brown (7.5YR 6/4) very gravelly loam, brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; common medium and fine and few very fine roots; common very fine and few fine irregular pores; about 20 percent cobbles and 35 percent gravel; slightly acid; clear smooth boundary.

C2—14 to 21 inches; pink (5YR 7/3) very cobbly sandy clay loam, strong brown (7.5YR 4/6) moist; massive;

soft, very friable, nonsticky and nonplastic; few medium, fine, and very fine roots; common very fine irregular pores; about 30 percent cobbles and 30 percent gravel; slightly acid; abrupt smooth boundary.

2R—21 inches; granite.

Moncha Series

The soils in the Moncha series are classified as fine-silty, mixed, mesic Aridic Haplustalfs. These deep, well drained soils formed in alluvium derived dominantly from siltstone and shale. They are on fan terraces, in valleys, and on mesas. Slope is 2 to 10 percent. Elevation is 6,800 to 7,300 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 115 to 130 days.

Typical pedon of Moncha silt loam, 2 to 10 percent slopes; about 7 miles north of Atarque Lake; 640 feet east and 600 feet north of the southwest corner of sec. 30, T. 8 N., R. 18 W.

A—0 to 2 inches; light red (2.5YR 6/6) silt loam, reddish brown (2.5YR 4/4) moist; moderate fine granular structure; soft, very friable, slightly sticky and nonplastic; common very fine roots; slightly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bt1—2 to 12 inches; red (2.5YR 5/6) silty clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; few thin clay films on faces of peds and in pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

Bt2—12 to 21 inches; red (2.5YR 5/6) silty clay loam, dark reddish brown (2.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine tubular pores; few thin clay films on faces of peds and in pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; gradual smooth boundary.

C1—21 to 38 inches; red (2.5YR 5/6) silty clay loam, reddish brown (2.5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; common very fine irregular pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; gradual smooth boundary.

C2—38 to 60 inches; red (2.5YR 5/8) silty clay loam, red (2.5YR 4/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; few very fine irregular pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline.

The depth to the base of the Bt horizon is 14 to 30 inches. The Bt and C horizons are silty clay loam or silt loam. The content of clay in the Bt horizon is 25 to 35 percent.

Montecito Series

The soils in the Montecito series are classified as fine, mixed, mesic Aridic Haplustalfs. These deep, well drained soils formed in mixed alluvium. They are on mesas and hills, in valleys between lava ridges, and on ridges. Slope is 1 to 15 percent. Elevation is 6,800 to 7,500 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 52 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Montecito fine sandy loam, 1 to 15 percent slopes; about 3 miles southwest of Fence Lake, 0.5 mile west of a gravel pit; 1,300 feet west and 120 feet south of the northeast corner of sec. 9, T. 4 N., R. 18 W.

A—0 to 5 inches; dark brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, friable, slightly sticky and nonplastic; common very fine and fine roots; common fine irregular pores; neutral; abrupt smooth boundary.

Bt—5 to 20 inches; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; moderate medium angular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common fine irregular pores; common moderately thick clay films on faces of peds and in pores; neutral; abrupt smooth boundary.

Btk—20 to 30 inches; strong brown (7.5YR 4/6) clay, strong brown (7.5YR 4/6) moist; moderate medium prismatic structure; very hard, firm, sticky and plastic; common very fine and fine roots; few very fine tubular pores; common thick clay films on faces of peds and in pores; about 5 percent cobbles and 5 percent gravel; slightly effervescent; common medium irregular seams and soft masses of calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bk1—30 to 42 inches; pink (7.5YR 8/4) gravelly clay loam, reddish yellow (7.5YR 6/6) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine irregular pores; about 10 percent cobbles and 25 percent gravel; violently effervescent; many coarse irregular

soft masses of calcium carbonate; mildly alkaline; clear smooth boundary.

Bk2—42 to 60 inches; pink (7.5YR 8/4) gravelly clay loam, pink (7.5YR 7/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine irregular pores; about 10 percent cobbles and 25 percent gravel; violently effervescent; many coarse irregular soft masses of calcium carbonate; mildly alkaline.

Depth to the Bk horizon is 25 to 35 inches. The content of rock fragments is less than 15 percent in the Bt horizon, but it may increase to as much as 40 percent in the lower part of the Bk horizon.

The A horizon is fine sandy loam or clay loam. It has hue of 7.5YR or 10YR, value of 4 or 5 (3 or 4 moist), and chroma of 3 or 4. The Bt horizon is clay or clay loam. It has hue of 7.5YR or 10YR, value of 4 to 6 (3 to 5 moist), and chroma of 3 to 6. The Bk horizon is clay loam, clay, or sandy clay. It has 10 to 35 percent rock fragments. It has hue of 7.5YR or 10YR, value of 7 or 8 (6 or 7 moist), and chroma of 2 to 4.

Moreno Series

The soils in the Moreno series are classified as fine, mixed Typic Argiborolls. These deep, well drained soils formed in mixed alluvium. They are on fan terraces. Slope is 1 to 10 percent. Elevation is 7,800 to 8,200 feet. The average annual precipitation is 20 to 24 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Moreno loam, 1 to 10 percent slopes; about 1.25 miles south of Page; 2,200 feet west and 1,800 feet south of the northeast corner of sec. 5, T. 12 N., R. 15 W.

A—0 to 11 inches; reddish brown (5YR 5/3) loam, dark reddish brown (5YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine irregular pores; neutral; clear smooth boundary.

Bw—11 to 14 inches; yellowish red (5YR 5/6) loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; hard, very friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; about 10 percent gravel; neutral; clear smooth boundary.

Bt1—14 to 20 inches; red (2.5YR 4/6) clay loam, dark red (2.5YR 3/6) moist; moderate fine subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 10 percent gravel; neutral; clear smooth boundary.

Bt2—20 to 35 inches; reddish brown (2.5YR 4/4) clay, dark red (2.5YR 3/6) moist; moderate fine subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine tubular pores; many thick clay films on faces of peds and in pores; about 10 percent gravel; mildly alkaline; clear smooth boundary.

Bt3—35 to 60 inches; red (2.5YR 5/6) very gravelly clay loam, red (2.5YR 4/6) moist; moderate fine subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 35 percent gravel; mildly alkaline.

The content of rock fragments ranges from 0 to 10 percent in the A horizon, from 0 to 15 percent in the upper part of the Bt horizon, and from 25 to 45 percent in the lower part of the Bt horizon. The Bt horizon is clay loam, clay, gravelly clay, or very gravelly clay loam.

Moreno Variant

The soils in the Moreno Variant are classified as fine-loamy, mixed Mollic Eutroboralfs. These deep, well drained soils formed in mixed alluvium. They are on fan terraces and toe slopes. Slope is 2 to 10 percent. Elevation is 8,000 to 8,300 feet. The average annual precipitation is 20 to 24 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 85 to 105 days.

Typical pedon of Moreno Variant loam, 2 to 10 percent slopes; about 0.5 mile north of Johnny Mack Canyon; 180 feet west and 200 feet north of the southeast corner of sec. 6, T. 11 N., R. 14 W.

A—0 to 7 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; common very fine irregular pores; slightly acid; clear smooth boundary.

E1—7 to 13 inches; brown (7.5YR 5/4) very fine sandy loam, dark brown (7.5YR 3/4) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine irregular pores; neutral; clear smooth boundary.

E2—13 to 22 inches; strong brown (7.5YR 5/6) very fine sandy loam, strong brown (7.5YR 4/6) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine irregular pores; neutral; abrupt smooth boundary.

Bt1—22 to 35 inches; red (2.5YR 4/6) clay loam, reddish brown (2.5YR 4/4) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine, fine, and medium roots; common very fine irregular and few fine tubular pores; many moderately thick clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—35 to 49 inches; red (2.5YR 5/6) clay loam, dark red (2.5YR 3/6) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and nonplastic; few very fine and fine roots; few very fine irregular and tubular pores; common moderately thick clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt3—49 to 60 inches; red (2.5YR 5/6) sandy clay loam, dark red (2.5YR 3/6) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and nonplastic; few very fine and fine roots; few very fine irregular and tubular pores; few thin clay films on faces of peds and in pores; neutral.

Navajo Series

The soils in the Navajo series are classified as fine, mixed (calcareous), mesic Vertic Torrifluvents. These deep, well drained soils formed in mixed alluvium. They are on alluvial fans, in drainageways, and on flood plains. Slope is 1 to 5 percent. Elevation is 5,400 to 6,000 feet. The average annual precipitation is 7 to 10 inches. The average annual air temperature is 51 to 55 degrees F, and the frost-free period is 140 to 165 days.

Typical pedon of Navajo silty clay loam, 1 to 5 percent slopes; about 3 miles west of Suwanee; 2,376 feet west and 2,904 feet south of the northeast corner of sec. 7, T. 8 N., R. 3 W.

A—0 to 3 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; moderate fine granular structure; slightly hard, friable, sticky and plastic; common medium and fine roots; common very fine irregular pores; violently effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C1—3 to 8 inches; reddish brown (5YR 4/4) silty clay, dark reddish brown (5YR 3/4) moist; massive; slightly hard, friable, sticky and plastic; common medium and fine roots; common very fine irregular pores; cracks more than 0.5 inch wide common during dry periods; violently effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C2—8 to 32 inches; reddish brown (5YR 4/4) silty clay, dark reddish brown (5YR 3/4) moist; massive; very hard, firm, very sticky and very plastic; common very fine and fine roots; common very fine irregular pores; cracks more than 0.5 inch wide common during dry periods; common moderately thick slickensides; violently effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C3—32 to 60 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine irregular pores; violently effervescent; disseminated calcium carbonate; mildly alkaline.

The A horizon is silty clay loam or clay loam. It has hue of 2.5YR or 5YR, value of 4 or 5 (3 or 4 moist), and chroma of 3 or 4. The C horizon is silty clay, clay, silty clay loam, or clay loam. It has hue of 2.5YR or 5YR, value of 4 or 5 (3 or 4 moist), and chroma of 3 or 4. In some pedons it has gypsum crystals in the lower part.

Netoma Series

The soils in the Netoma series are classified as coarse-loamy, gypsic, mesic Typic Gypsiorthids. These deep, well drained soils formed in alluvium derived dominantly from gypsiferous material. They are on fan terraces and hills. Slope is 2 to 12 percent. Elevation is 5,800 to 6,500 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Netoma sandy loam, 2 to 12 percent slopes; about 1 mile southeast of Chicken Mountain; 2,112 feet west and 1,584 feet north of the southeast corner of sec. 36, T. 6 N., R. 4 W.

A—0 to 4 inches; strong brown (7.5YR 5/6) sandy loam, dark brown (7.5YR 3/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; common very fine irregular pores; slightly effervescent; about 5 percent gravel; mildly alkaline; abrupt smooth boundary.

Bw—4 to 12 inches; strong brown (7.5YR 5/6) sandy loam, strong brown (7.5YR 4/6) moist; weak fine subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few fine and very fine roots; common very fine irregular pores; slightly effervescent; about 5 percent gravel; moderately alkaline; clear smooth boundary.

By1—12 to 22 inches; light brown (7.5YR 6/4), gypsiferous sandy loam, strong brown (7.5YR 4/6) moist; massive; soft, friable, nonsticky and

nonplastic; few fine and very fine roots; few very fine irregular pores; common medium nests of gypsum crystals; strongly effervescent; disseminated calcium carbonate; about 5 percent gravel; mildly alkaline; abrupt smooth boundary.

By2—22 to 37 inches; reddish yellow (7.5YR 6/6), gypsiferous sandy loam, strong brown (7.5YR 4/6) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; common medium nests of gypsum crystals; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

By3—37 to 60 inches; reddish yellow (7.5YR 6/6), gypsiferous sandy loam, strong brown (7.5YR 4/6) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; common medium nests of gypsum crystals; strongly effervescent; disseminated calcium carbonate; mildly alkaline.

Depth to the gypsiferous material ranges from 5 to 15 inches. The content of rock fragments ranges from 0 to 10 percent throughout the profile.

Nogal Series

The soils in the Nogal series are classified as fine, mixed, mesic Aridic Haplustalfs. These moderately deep, well drained soils formed in alluvium derived dominantly from shale and sandstone. They are on mesas and hills. Slope is 1 to 10 percent. Elevation is 6,800 to 7,500 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Nogal sandy loam, in an area of Nogal-Galestina sandy loams, 1 to 10 percent slopes; about 1.5 miles west of New Mexico Highway 32 and 3.25 miles south of the McKinley County line; 1,000 feet east and 1,180 feet south of the northwest corner of sec. 24, T. 8 N., R. 18 W.

A—0 to 1 inch; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and very fine roots; common fine and very fine irregular pores; neutral; abrupt smooth boundary.

Bt1—1 to 7 inches; brown (7.5YR 4/4) clay loam, dark brown (7.5YR 3/4) moist; weak medium subangular blocky structure; slightly hard, firm, sticky and slightly plastic; many fine and very fine roots; common fine and very fine irregular pores; few thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—7 to 15 inches; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; common very fine tubular pores; common thick clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt3—15 to 19 inches; brown (7.5YR 4/4) clay, brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to strong medium angular blocky; hard, firm, very sticky and plastic; few very fine roots; few very fine tubular pores; many thick clay films on faces of peds and in pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Bk—19 to 31 inches; strong brown (7.5YR 5/6) clay, strong brown (7.5YR 4/6) moist; massive; hard, firm, sticky and slightly plastic; few very fine roots; few very fine irregular pores; strongly effervescent; few medium irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

Cr—31 inches; interbedded shale and sandstone.

The depth to paralithic contact is 20 to 40 inches. Depth to the base of the argillic horizon is 16 to 35 inches. The calcium carbonate equivalent in the Bk horizon is 1 to 14 percent.

Oelop Series

The soils in the Oelop series are classified as fine-loamy, mixed, mesic Ustollic Haplargids. These deep, well drained soils formed in mixed alluvium. They are in the lower areas on mesas and in swales and drainageways. Slope is 0 to 3 percent. Elevation is 6,000 to 6,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Oelop loam, in an area of Harvey-Oelop association, 0 to 5 percent slopes; about 4.5 miles southwest of South Garcia; 2,480 feet east and 100 feet north of the southwest corner of sec. 33, T. 8 N., R. 3 W.

A—0 to 3 inches; dark yellowish brown (10YR 4/4) loam, dark yellowish brown (10YR 3/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; few fine irregular pores; mildly alkaline; abrupt smooth boundary.

Bt1—3 to 8 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist;

moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and medium roots; few fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt2—8 to 16 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine and medium and common fine roots; few fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bk1—16 to 34 inches; dark yellowish brown (10YR 4/4) clay loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, sticky and plastic; few very fine and fine roots; few fine irregular pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—34 to 44 inches; dark yellowish brown (10YR 4/4) loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine irregular pores; strongly effervescent; few fine irregular filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk3—44 to 60 inches; dark yellowish brown (10YR 4/4) loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine irregular pores; strongly effervescent; few fine irregular seams and filaments of calcium carbonate; moderately alkaline.

Depth to the base of the Bt horizon is 15 to 30 inches. The content of rock fragments ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 7.5YR or 10YR and value of 4 to 6 (3 to 5 moist). The Bt horizon is loam or clay loam. It has hue of 7.5YR or 10YR, value of 4 to 6 (3 to 5 moist), and chroma of 3 or 4. The Bk horizon has hue of 7.5YR or 10YR, value of 4 to 7 (4 or 5 moist), and chroma of 3 to 6. The calcium carbonate equivalent in this horizon is less than 10 percent.

Paguate Series

The soils in the Paguate series are classified as fine, mixed, mesic Aridic Haplustalfs. These moderately deep, well drained soils formed in alluvium and windblown sediments. They are on basalt-capped mesas and plateaus. Slope is 1 to 5 percent. Elevation is 7,000 to 8,000 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 52 degrees F, and the frost-free period is 100 to 130 days.

Typical pedon of Paguate loam, in an area of Paguate-Hackroy complex, 1 to 5 percent slopes; about 4 miles west of Bibo; long. 107 degrees 25 minutes 08 seconds W. and lat. 35 degrees 11 minutes 53 seconds N.

A—0 to 3 inches; dark brown (7.5YR 4/4) loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; few fine and common very fine roots; common fine irregular pores; about 10 percent gravel; neutral; abrupt smooth boundary.

BA—3 to 8 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few medium and common very fine roots; few fine tubular pores; neutral; clear smooth boundary.

Bt1—8 to 16 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; weak medium prismatic structure parting to moderate fine subangular blocky; very hard, firm, sticky and plastic; few medium and common very fine roots; few fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt2—16 to 19 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; few fine and common very fine roots; few very fine tubular pores; mildly alkaline; abrupt smooth boundary.

Bk—19 to 33 inches; pink (5YR 7/3) gravelly clay loam, light reddish brown (5YR 6/3) moist; massive; soft, friable, slightly sticky and slightly plastic; about 20 percent gravel; violently effervescent; disseminated calcium carbonate and many medium irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—33 inches; basalt.

The depth to bedrock is 20 to 40 inches. Depth to the base of the Bt horizon, or the top of the Bk horizon, is 11 to 33 inches.

The A horizon is loam or cobbly clay loam. The content of rock fragments ranges from 0 to 20 percent. This horizon has value of 4 to 6 (3 to 5 moist) and chroma of 3 or 4.

The content of rock fragments in the BA horizon ranges from 0 to 15 percent. This horizon has hue of

5YR or 7.5YR, value of 4 to 6 (3 or 4 moist), and chroma of 3 or 4.

The Bt horizon is clay or gravelly clay. The content of rock fragments ranges from 0 to 20 percent. This horizon has hue of 5YR or 7.5YR, value of 4 to 6 (3 or 4 moist), and chroma of 3 to 6.

The Bk horizon is gravelly clay loam or clay loam. The content of rock fragments ranges from 10 to 30 percent. This horizon has hue of 5YR or 7.5YR, value of 6 to 8 (5 to 7 moist), and chroma of 3 to 6. The calcium carbonate equivalent is 25 to 40 percent.

Palma Series

The soils in the Palma series are classified as coarse-loamy, mixed, mesic Ustollic Haplargids. These deep, well drained soils formed in eolian material derived dominantly from sandstone. They are on stable sand dunes and in interdune areas. Slope is 1 to 7 percent. Elevation is 5,900 to 7,100 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Palma loamy fine sand, in an area of Mespun-Palma association, 1 to 12 percent slopes; about 1 mile east of the Roundy Ranch House; 1,800 feet west and 1,620 feet north of the southeast corner of sec. 9, T. 12 N., R. 9 W.

A—0 to 4 inches; light brown (7.5YR 6/4) loamy fine sand, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; common very fine irregular pores; mildly alkaline; abrupt smooth boundary.

Bt1—4 to 11 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; few very fine irregular pores; few thin clay films coating sand grains; mildly alkaline; clear smooth boundary.

Bt2—11 to 21 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few very fine tubular pores; few thin clay films coating and bridging sand grains; mildly alkaline; abrupt smooth boundary.

Bk1—21 to 32 inches; reddish yellow (7.5YR 6/6) sandy loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; slightly effervescent; few fine irregular seams and filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—32 to 60 inches; reddish yellow (7.5YR 6/6) sandy loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; strongly effervescent; few fine irregular seams, filaments, and soft masses of calcium carbonate; moderately alkaline.

The Bk horizon is fine sandy loam or sandy loam.

Parkay Series

The soils in the Parkay series are classified as loamy-skeletal, mixed Argic Pachic Cryoborolls. These deep, well drained soils formed in colluvium and alluvium derived dominantly from basalt and andesite. They are on mountains, hills, and ridges. Slope is 15 to 45 percent. Elevation is 8,200 to 10,300 feet. The average annual precipitation is 22 to 26 inches. The average annual air temperature is 36 to 42 degrees F, and the frost-free period is 60 to 80 days.

Typical pedon of Parkay stony loam, in an area of Parkay-Rock outcrop complex, 15 to 45 percent slopes; about 1.5 miles southwest of Big Lake; long. 107 degrees 32 minutes 00 seconds W. and lat. 35 degrees 15 minutes 01 second N.

Oi—1 inch to 0; thin covering of partly decomposed fir and pine needles and aspen leaves.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) stony loam, black (10YR 2/1) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; common very fine irregular pores; about 5 percent stones, 5 percent cobbles, and 15 percent gravel; mildly alkaline; abrupt smooth boundary.

A2—2 to 8 inches; dark grayish brown (10YR 4/2) very gravelly sandy clay loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; few medium and common very fine roots; common very fine irregular pores; about 10 percent cobbles and 25 percent gravel; neutral; clear smooth boundary.

Bt1—8 to 20 inches; brown (7.5YR 5/4) very cobbly sandy clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few medium and common very fine roots; common very fine tubular and irregular pores; few thin clay films on faces of peds and in pores; about 15 percent cobbles and 25 percent gravel; slightly acid; clear smooth boundary.

Bt2—20 to 23 inches; brown (7.5YR 5/4) very cobbly sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few coarse and common very fine roots; common very fine tubular pores; few thin clay films on faces of peds and in pores; about 15 percent cobbles and 25 percent gravel; slightly acid; clear smooth boundary.

C1—23 to 35 inches; brown (7.5YR 5/4) very cobbly sandy clay loam, dark brown (7.5YR 3/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few coarse and common very fine roots; common very fine irregular pores; about 25 percent cobbles and 20 percent gravel; neutral; abrupt smooth boundary.

C2—35 to 60 inches; light brown (7.5YR 6/4) very cobbly sandy clay loam, dark brown (7.5YR 4/4) moist; massive; hard, friable; slightly sticky and slightly plastic; few fine and very fine roots; common very fine irregular pores; about 30 percent cobbles and 20 percent gravel; neutral.

The content of rock fragments in the control section ranges from 35 to 60 percent. Depth to the base of the Bt horizon ranges from 20 to 30 inches. The thickness of the mollic epipedon ranges from 20 to 24 inches.

The Bt horizon is very gravelly sandy clay loam, very cobbly sandy clay loam, or very cobbly clay loam. The C horizon is very cobbly sandy clay loam or extremely cobbly sandy clay loam. The content of rock fragments in this horizon ranges from 40 to 70 percent, including 25 to 45 percent cobbles and 15 to 25 percent gravel.

Penistaja Series

The soils in the Penistaja series are classified as fine-loamy, mixed, mesic Ustollic Haplargids. These deep, well drained soils formed in alluvium and eolian material derived dominantly from sandstone. They are on cuestas and ridges, in valleys between lava ridges and in other valleys, and on fan terraces. Slope is 0 to 10 percent. Elevation is 5,700 to 7,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 115 to 140 days.

Typical pedon of Penistaja fine sandy loam, 2 to 10 percent slopes; about 2.25 miles north of Anaconda Mill; 400 feet west and 2,000 feet north of the southeast corner of sec. 6, T. 12 N., R. 10 W.

A—0 to 2 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; neutral; abrupt smooth boundary.

BA—2 to 6 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular pores; few thin clay films in pores; neutral; abrupt smooth boundary.

Bt1—6 to 16 inches; strong brown (7.5YR 4/6) sandy clay loam, brown (7.5YR 4/4) moist; strong medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt2—16 to 22 inches; strong brown (7.5YR 5/6) sandy clay loam, strong brown (7.5YR 4/6) moist; moderate medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; abrupt smooth boundary.

Bk—22 to 53 inches; light brown (7.5YR 6/4) sandy loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine irregular pores; violently effervescent; disseminated calcium carbonate and common medium rounded soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

C—53 to 60 inches; reddish yellow (7.5YR 6/6) sandy loam, strong brown (7.5YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

Depth to the base of the Bt horizon is 13 to 35 inches. In some pedons this horizon is slightly calcareous. The calcium carbonate equivalent is less than 15 percent in the upper 40 inches. In some pedons the soils have as much as 15 percent gravel throughout. In other pedons buried horizons are below a depth of 40 inches.

The A horizon is fine sandy loam or sandy loam. It has hue of 5YR to 10YR, value of 4 to 6 (3 to 5 moist), and chroma of 2 to 4. The Bt horizon is sandy clay loam or clay loam. It has hue of 5YR or 7.5YR, value of 4 to 6 (4 or 5 moist), and chroma of 4 to 6. The Bk and C horizons are sandy loam, fine sandy loam, sandy clay loam, or loam. They have hue of 5YR to 10YR, value of 5 to 8 (4 to 6 moist), and chroma of 3 to 6.

Pinitos Series

The soils in the Pinitos series are classified as fine-loamy, mixed, mesic Aridic Haplustalfs. These deep, well drained soils formed in wind-modified alluvium derived dominantly from sandstone. They are on hills and mesa tops. Slope is 1 to 10 percent. Elevation is 6,800 to 7,500 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Pinitos sandy loam, in an area of Pinitos-Ribera sandy loams, 1 to 10 percent slopes; about 1 mile east of Balok Ranch; 1,080 feet west and 700 feet north of the southwest corner of sec. 3, T. 8 N., R. 16 W.

A—0 to 2 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine irregular pores; neutral; clear smooth boundary.

Bt1—2 to 6 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine and few medium roots; common very fine irregular and few very fine tubular pores; few thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—6 to 14 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and slightly plastic; common fine and very fine and few medium roots; common fine tubular pores; many moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt3—14 to 24 inches; light brown (7.5YR 6/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and nonplastic; common very fine and few fine roots; few fine tubular pores; few thin clay films in pores and on faces of peds; mildly alkaline; abrupt smooth boundary.

Bk1—24 to 38 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Bk2—38 to 60 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; strongly effervescent; common medium irregular soft masses of calcium carbonate; mildly alkaline.

Depth to the base of the Bt horizon and to an accumulation of calcium carbonate is 18 to 31 inches. The Bt horizon is sandy clay loam or clay loam. The Bk horizon is sandy loam or sandy clay loam. The calcium carbonate equivalent in this horizon is 1 to 10 percent.

Pojoaque Series

The soils in the Pojoaque series are classified as fine-loamy, mixed (calcareous), mesic Ustic Torriorthents. These deep, well drained soils formed in alluvium and colluvium derived dominantly from sandstone and shale. They are on mesa breaks. Slope is 5 to 30 percent. Elevation is 6,200 to 6,900 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Pojoaque very cobbly loam, in an area of Poley-Pojoaque very cobbly loams, 5 to 30 percent slopes; about 3 miles southeast of Marquez on New Mexico State Road 279; long. 107 degrees 15 minutes 44.6 seconds W. and lat. 35 degrees 15 minutes 32 seconds N.

A1—0 to 3 inches; brown (10YR 4/3) very cobbly loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, very friable, nonsticky and slightly plastic; few coarse, common fine, and many very fine roots; few fine irregular pores; about 5 percent stones, 20 percent cobbles, and 20 percent gravel; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

A2—3 to 7 inches; brown (10YR 5/3) gravelly clay loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few coarse and many very fine roots; few fine irregular pores; about 5 percent cobbles and 25 percent gravel; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Ck1—7 to 30 inches; light yellowish brown (10YR 6/4) cobbly clay loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, slightly sticky and slightly plastic; few coarse and common very fine roots; common very fine irregular pores; about 10 percent cobbles and 15 percent gravel; violently

effervescent; few fine irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Ck2—30 to 45 inches; very pale brown (10YR 7/3) gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; common very fine irregular pores; about 5 percent cobbles and 25 percent gravel; violently effervescent; common fine irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Ck3—45 to 60 inches; very pale brown (10YR 7/3) gravelly sandy clay loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable, slightly sticky and nonplastic; few fine and common very fine roots; about 5 percent cobbles and 20 percent gravel; violently effervescent; common medium irregular soft masses of calcium carbonate; mildly alkaline.

A few stones are on the surface. The content of rock fragments in the A horizon ranges from 30 to 60 percent. The C horizon is gravelly sandy clay loam, cobbly clay loam, or gravelly clay loam. The content of rock fragments in this horizon ranges from 15 to 35 percent. The calcium carbonate equivalent ranges from 5 to 15 percent.

Poley Series

The soils in the Poley series are classified as fine, mixed, mesic Ustollic Haplargids. These deep, well drained soils formed in alluvium and colluvium derived dominantly from shale. They are on benches, ridges, hills, and mesa breaks. Slope is 2 to 30 percent. Elevation is 5,800 to 7,100 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Poley very cobbly loam, in an area of Poley-Rock outcrop complex, 2 to 25 percent slopes; about 1 mile west of Chicken Mountain; 2,100 feet east and 100 feet north of the southwest corner of sec. 28, T. 6 N., R. 4 W.

A—0 to 3 inches; reddish brown (5YR 4/4) very cobbly loam, reddish brown (5YR 4/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and very fine roots; common fine irregular pores; about 5 percent stones, 15 percent cobbles, and 15 percent gravel; slightly effervescent; disseminated calcium carbonate; neutral; abrupt smooth boundary.

Bt—3 to 12 inches; reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4) moist; strong medium subangular blocky structure; hard, firm, sticky and plastic; few coarse and fine and common very fine roots; common fine tubular pores; many thick clay films on faces of peds and in pores; about 1 percent cobbles; mildly alkaline; abrupt smooth boundary.

Btk—12 to 22 inches; yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few coarse and very fine roots; common fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 1 percent cobbles; violently effervescent; common coarse irregular soft masses of calcium carbonate; moderately alkaline; gradual smooth boundary.

Bk1—22 to 49 inches; light reddish brown (5YR 6/4) clay, reddish brown (5YR 5/4) moist; massive; hard, firm, sticky and plastic; few coarse and very fine roots; common fine tubular pores; about 10 percent cobbles and 5 percent gravel; violently effervescent; common coarse irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—49 to 60 inches; pink (5YR 7/3) clay loam, light reddish brown (5YR 6/4) moist; massive; soft, friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; about 10 percent cobbles; violently effervescent; many coarse irregular soft masses of calcium carbonate; strongly alkaline.

The A horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 or 4. The content of rock fragments ranges from 35 to 50 percent.

The Bt horizon is clay or clay loam. It has hue of 5YR to 7.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 3 to 6. The content of rock fragments ranges from 0 to 15 percent.

The Bk horizon is loam, clay, or clay loam. It has hue of 5YR to 10YR. The content of rock fragments ranges from 0 to 15 percent. The calcium carbonate equivalent is 15 to 30 percent.

Quintana Series

The soils in the Quintana series are classified as fine-loamy, mixed, mesic Typic Ustochrepts. These deep, well drained soils formed in wind-modified, mixed alluvium. They are in valleys and on ridges and terraces. Slope is 5 to 15 percent. Elevation is 6,400 to 6,900 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 115 to 130 days.

Typical pedon of Quintana fine sandy loam, in an area of Flugle-Quintana complex, 2 to 15 percent slopes; about 1.5 miles north of Thompson Draw; 1,750 feet south and 180 feet east of the northwest corner of sec. 6, T. 7 N., R. 19 W.

A—0 to 2 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bw—2 to 11 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bk1—11 to 33 inches; pink (7.5YR 7/4) loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common very fine irregular pores; violently effervescent; common medium irregular seams and filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—33 to 46 inches; pink (7.5YR 7/4) sandy clay loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; few fine tubular pores; violently effervescent; common medium irregular seams and filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk3—46 to 60 inches; pink (7.5YR 7/4) sandy loam, light brown (7.5YR 6/4) moist; massive; soft, friable, nonsticky and nonplastic; few very fine roots; common very fine irregular pores; violently effervescent; few fine irregular seams and filaments of calcium carbonate; moderately alkaline.

The A horizon is sandy loam or fine sandy loam. It has value of 5 or 6 (4 or 5 moist) and chroma of 3 or 4. The Bw horizon is fine sandy loam or sandy clay loam. It has hue of 10YR or 7.5YR, value of 5 or 6 (4 or 5 moist), and chroma of 3 or 4. The Bk horizon is sandy clay loam, sandy loam, loam, clay loam, or fine sandy loam. It has value of 4 to 8 (4 to 7 moist) and chroma of 4 to 6.

The Quintana soils in this survey receive less annual precipitation and more precipitation in winter than is defined as the range for the series. These differences, however, do not significantly affect the use and management of the soils.

Rana Series

The soils in the Rana series are classified as very fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents. These deep, well drained soils formed in alluvium and colluvium derived dominantly from red-bed shale. They are on mesa breaks. Slope is 2 to 25 percent. Elevation is 5,800 to 7,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Rana very cobbly clay, in an area of Rana-Rock outcrop complex, 2 to 25 percent slopes; about 8 miles southwest of the headquarters of Harrington Ranch; 1,600 feet east and 990 feet south of the northwest corner of sec. 3, T. 6 N., R. 5 W.

A—0 to 3 inches; red (2.5YR 4/6) very cobbly clay, yellowish red (5YR 4/6) moist; strong fine granular structure; soft, firm, sticky and plastic; few very fine and common fine and medium roots; common very fine irregular pores; about 30 percent cobbles and 10 percent gravel; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

C1—3 to 20 inches; red (2.5YR 4/6) clay, yellowish red (5YR 4/6) moist; massive; very hard, very firm, very sticky and very plastic; few very fine and common fine and medium roots; few very fine irregular and few fine tubular pores; few small slickensides; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—20 to 34 inches; red (2.5YR 4/6) clay, yellowish red (5YR 4/6) moist; massive; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine irregular and few fine tubular pores; strongly effervescent; few fine irregular seams and filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

C3—34 to 52 inches; red (2.5YR 4/6) clay, dark red (2.5YR 3/6) moist; massive; very hard, firm, sticky and plastic; few very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; strongly alkaline; gradual wavy boundary.

C4—52 to 60 inches; reddish brown (2.5YR 4/4) clay, red (2.5YR 4/6) moist; massive; very hard, firm, sticky and plastic; few very fine irregular pores; about 5 percent pebble-sized shale fragments; strongly effervescent; disseminated calcium carbonate; strongly alkaline.

The content of rock fragments in the A horizon ranges from 35 to 55 percent. The content of rock

fragments, mainly shale, in the C horizon is less than 10 percent. Most of the fragments are in the lower part of the horizon.

Raton Series

The soils in the Raton series are classified as clayey-skeletal, mixed Lithic Argiborolls. These shallow and very shallow, well drained soils formed in windblown sediments and mixed alluvium. They are on mesas, in depressions and swales, and on basalt plains, ridges, and hills. Slope is 1 to 10 percent. Elevation is 7,200 to 8,800 feet. The average annual precipitation is 16 to 24 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free period is 80 to 110 days.

Typical pedon of Raton very cobbly loam, in an area of Raton-Rock outcrop complex, 1 to 10 percent slopes; about 1.5 miles southwest of "Hole in the Wall"; 400 feet west and 2,400 feet south of the northeast corner of sec. 26, T. 7 N., R. 12 W.

Oi—1 inch to 0; pine needles and leaves.

A—0 to 5 inches; dark reddish brown (5YR 3/3) very cobbly loam, dark reddish brown (5YR 2.5/2) moist; moderate fine granular structure; soft, friable, slightly sticky and slightly plastic; many very fine and common fine roots; common very fine irregular pores; about 30 percent cobbles, 5 percent stones, and 10 percent gravel; neutral; clear smooth boundary.

Bt1—5 to 9 inches; reddish brown (5YR 4/3) very cobbly clay, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; few very fine and fine and common coarse roots; common fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 30 percent cobbles and 10 percent gravel; neutral; clear wavy boundary.

Bt2—9 to 13 inches; reddish brown (5YR 4/4) very cobbly clay, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; very hard, very firm, sticky and plastic; few very fine and fine and common coarse roots; few fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 45 percent cobbles and 10 percent gravel; neutral; abrupt smooth boundary.

2R—13 inches; basalt.

The depth to bedrock ranges from 6 to 20 inches. The mollic epipedon is 6 to 14 inches thick.

The A horizon is very cobbly or cobbly loam. The content of rock fragments ranges from 25 to 60 percent, by volume, including 0 to 15 percent stones, 20 to 35 percent cobbles, and 5 to 10 percent gravel. This horizon has hue of 5YR to 10YR, value of 3 to 5 (2 or 3 moist), and chroma of 2 or 3.

The Bt horizon is very cobbly clay or very cobbly clay loam. The content of rock fragments ranges from 40 to 60 percent, by volume, including 0 to 5 percent stones, 35 to 45 percent cobbles, and 5 to 10 percent gravel. This horizon has hue of 5YR or 7.5YR, value of 3 to 5 dry or moist, and chroma of 2 to 4.

Ribera Series

The soils in the Ribera series are classified as fine-loamy, mixed, mesic Aridic Haplustalfs. These moderately deep, well drained soils formed in wind-modified alluvium derived dominantly from sandstone. They are on hills and mesas. Slope is 1 to 10 percent. Elevation is 6,800 to 7,500 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Ribera sandy loam, in an area of Pinitos-Ribera sandy loams, 1 to 10 percent slopes; about 7 miles north of Beggs Cattle Camp; 150 feet west and 890 feet south of the northeast corner of sec. 27, T. 8 N., R. 18 W.

A—0 to 3 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; neutral; abrupt smooth boundary.

BA—3 to 6 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots; few very fine and fine irregular pores; neutral; clear smooth boundary.

Bt1—6 to 10 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots; common very fine tubular pores; common thin clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt2—10 to 16 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; strong medium subangular blocky structure; hard, firm, sticky and slightly plastic; common very fine and fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bk1—16 to 27 inches; yellowish brown (10YR 5/4) sandy clay loam, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, sticky and slightly plastic; few very fine roots; few very fine irregular pores; strongly effervescent; few fine irregular seams and filaments of calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bk2—27 to 39 inches; brown (10YR 5/3) clay loam, dark brown (10YR 4/3) moist; massive; hard, firm, sticky and slightly plastic; few very fine roots; few very fine irregular pores; violently effervescent; common medium irregular seams and filaments of calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—39 inches; sandstone.

The depth to bedrock is 20 to 40 inches. Depth to the base of the Bt horizon is 11 to 25 inches. This horizon is sandy clay loam or clay loam. The calcium carbonate equivalent in the Bk horizon is less than 15 percent.

Rizozo Series

The soils in the Rizozo series are classified as loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents. These shallow and very shallow, well drained soils formed in eolian material derived dominantly from sandstone. They are on hills, ridges, and mesas. Slope is 3 to 55 percent. Elevation is 6,000 to 6,700 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Rizozo loam, in an area of Bond-Rizozo-Rock outcrop complex, 2 to 20 percent slopes; about 2 miles southeast of Harrington Ranch House; 250 feet south and 1,600 feet west of the northeast corner of sec. 4, T. 5 N., R. 3 W.

A—0 to 2 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; few very fine roots; common very fine irregular pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C—2 to 14 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; massive; soft, very friable, slightly sticky and nonplastic; few very fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—14 inches; sandstone.

The depth to bedrock is 4 to 20 inches. The content of rock fragments ranges from 0 to 15 percent in the A and C horizons. These horizons are sandy loam or loam. The A horizon has hue of 2.5YR or 5YR, value of 3 or 4 dry or moist, and chroma of 4 or 5. The C horizon has hue of 2.5YR or 5YR, value of 3 or 4 dry or moist, and chroma of 4 to 6.

The Rizozo soil in map unit 434 has less silt than is defined as the range for the series. This difference, however, does not significantly affect the use and management of the soil.

Saido Series

The soils in the Saido series are classified as coarse-silty, gypsic, mesic Typic Gypsiorthids. These deep, well drained soils formed in alluvium derived dominantly from gypsiferous material. They are on fans and knolls. Slope is 1 to 12 percent. Elevation is 5,500 to 6,400 feet. The average annual precipitation is 8 to 12 inches. The average annual air temperature is 51 to 53 degrees F, and the frost-free period is 130 to 150 days.

Typical pedon of Saido loam, 1 to 12 percent slopes; about 7 miles south of Interstate 40 from the New Mexico Highway 6 exit; 528 feet west and 515 feet north of the southeast corner of sec. 19, T. 8 N., R. 3 W.

A—0 to 2 inches; reddish brown (5YR 5/4) loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, friable, slightly sticky and nonplastic; common very fine and few fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

By1—2 to 11 inches; white (10YR 8/1), gypsiferous loam, very pale brown (10YR 7/3) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few very fine irregular pores; common medium nests of gypsum; slightly effervescent; disseminated calcium carbonate; neutral; gradual wavy boundary.

By2—11 to 25 inches; white (10YR 8/1), gypsiferous loam, very pale brown (10YR 7/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; common medium nests of gypsum; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

By3—25 to 32 inches; white (10YR 8/2), gypsiferous loam, very pale brown (10YR 7/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine irregular pores; common medium nests of

gypsum; violently effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

By4—32 to 44 inches; very pale brown (10YR 8/4), gypsiferous loam, very pale brown (10YR 7/4) moist; massive; hard, friable, nonsticky and nonplastic; common medium nests of gypsum; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

By5—44 to 60 inches; white (10YR 8/1), gypsiferous loam, light gray (10YR 7/2) moist; massive; hard, friable, nonsticky and nonplastic; common soft accumulations of gypsum; violently effervescent; disseminated calcium carbonate; mildly alkaline.

Saladon Series

The soils in the Saladon series are classified as fine, montmorillonitic Typic Cryaquolls. These deep, poorly drained soils formed in mixed alluvium. They are in valleys and drainageways. Slope is 0 to 5 percent. Elevation is 7,900 to 8,300 feet. The average annual precipitation is 20 to 24 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Saladon clay loam, 0 to 5 percent slopes; about 1.5 miles southwest of Lookout Mountain; 200 feet east and 1,600 feet north of the southwest corner of sec. 11, T. 11 N., R. 14 W.

A—0 to 4 inches; dark brown (10YR 4/3) clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; common very fine and few fine irregular pores; slightly acid; abrupt smooth boundary.

C1—4 to 19 inches; black (10YR 2/1) clay, black (10YR 2/1) moist; massive; very hard, firm, sticky and plastic; common very fine and fine roots; few very fine irregular pores; slightly acid; clear smooth boundary.

C2—19 to 25 inches; black (10YR 2/1) clay, black (10YR 2/1) moist; few medium prominent dark yellowish brown (10YR 4/4) mottles; massive; very hard, firm, sticky and plastic; common very fine and few fine roots; few very fine irregular pores; about 5 percent gravel; slightly acid; abrupt smooth boundary.

C3—25 to 35 inches; yellowish brown (10YR 5/4) sandy clay, dark yellowish brown (10YR 4/4) moist; few medium prominent dark yellowish brown (10YR 4/6) mottles; massive; very hard, very firm, sticky and plastic; few very fine roots; common very fine and fine irregular pores; about 15 percent gravel; slightly acid; abrupt smooth boundary.

C4—35 to 45 inches; grayish brown (10YR 5/2) clay, very dark gray (N 3/0) moist; common medium prominent dark yellowish brown (10YR 4/6) mottles; massive; very hard, very firm, sticky and plastic; common very fine and few fine irregular pores; about 15 percent gravel; slightly acid; clear smooth boundary.

C5—45 to 60 inches; very dark gray (10YR 3/1) clay, very dark gray (N 3/0) moist; common medium prominent dark yellowish brown (10YR 4/6, 4/4) mottles; massive; very hard, very firm, sticky and plastic; few very fine irregular pores; slightly acid.

The mollic epipedon ranges from 20 to 40 inches in thickness. A fluctuating water table is at a depth of 18 to 36 inches.

The Saladon soils in this survey area are a taxadjunct to the series because the average annual temperature is about 5 degrees warmer, the temperature in summer is warmer, and the mollic epipedon is thicker than is defined as the range for the series. These differences, however, do not significantly affect the use and management of the soils.

San Mateo Series

The soils in the San Mateo series are classified as fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents. These deep, well drained soils formed in mixed alluvium. They are on flood plains and alluvial fans and in valleys and drainageways. Slope is 0 to 5 percent. Elevation is 5,800 to 6,600 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 110 to 145 days.

Typical pedon of San Mateo loam, in an area of Sparank-San Mateo complex, 0 to 5 percent slopes; about 1 mile northwest of Moquino; long. 107 degrees 18 minutes 21 seconds W. and lat. 35 degrees 11 minutes 10 seconds N.

A—0 to 2 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; common fine and very fine roots; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C1—2 to 12 inches; light olive brown (2.5Y 5/4) loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; common fine and very fine roots; common fine and very fine irregular

pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C2—12 to 29 inches; light olive brown (2.5Y 5/6) sandy clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; gradual smooth boundary.

C3—29 to 60 inches; light olive brown (2.5Y 5/6) sandy clay loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline.

The soils are mildly alkaline or moderately alkaline throughout.

The A horizon is loam, clay loam, or sandy clay loam. It has hue of 10YR or 2.5Y, value of 5 or 6 (3 to 5 moist), and chroma of 3 to 6. The calcium carbonate equivalent is less than 15 percent.

The C horizon is dominantly sandy clay loam, loam, clay loam, or silty clay loam. In some pedons it has thin strata of loam, silt loam, clay loam, silty clay loam, fine sandy loam, loamy sand, or sandy loam. It has hue of 10YR or 2.5Y, value of 5 or 6 (4 or 5 moist), and chroma of 3 to 6. The content of rock fragments ranges from 0 to 10 percent. The calcium carbonate equivalent is less than 15 percent.

Sheppard Series

The soils in the Sheppard series are classified as mixed, mesic Typic Torripsamments. These deep, somewhat excessively drained soils formed in eolian material derived dominantly from sandstone. They are on sand dunes and fans. Slope is 3 to 12 percent. Elevation is 5,400 to 6,000 feet. The average annual precipitation is 7 to 10 inches. The average annual air temperature is 51 to 55 degrees F, and the frost-free period is 140 to 165 days.

Typical pedon of Sheppard loamy fine sand, in an area of Sheppard-Shiprock association, 1 to 12 percent slopes; about 1 mile northeast of the headquarters of Marmon Ranch; 2,100 feet south and 2,380 feet east of the northwest corner of sec. 2, T. 7 N., R. 6 W.

A—0 to 4 inches; reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6) moist; weak fine granular structure; loose, nonsticky and nonplastic; few very fine and fine roots; mildly alkaline; clear smooth boundary.

C1—4 to 22 inches; reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine irregular pores; mildly alkaline; clear smooth boundary.

C2—22 to 47 inches; reddish yellow (5YR 6/6) loamy sand, yellowish red (5YR 4/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C3—47 to 60 inches; reddish yellow (5YR 6/6) loamy fine sand, yellowish red (5YR 5/6) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; slightly effervescent; disseminated calcium carbonate; mildly alkaline.

Shiprock Series

The soils in the Shiprock series are classified as coarse-loamy, mixed, mesic Typic Haplargids. These deep, well drained soils formed in wind-modified alluvium derived dominantly from sandstone. They are on stable dunes, in interdune areas, and on fan terraces, hills, and ridges. Slope is 1 to 10 percent. Elevation is 5,400 to 6,100 feet. The average annual precipitation is 7 to 10 inches. The average annual air temperature is 51 to 55 degrees F, and the frost-free period is 140 to 165 days.

Typical pedon of Shiprock sandy loam, in an area of Grieta-Shiprock association, 1 to 10 percent slopes; about 1.5 miles south of Suwanee; 217 feet south and 80 feet west of the northeast corner of sec. 15, T. 8 N., R. 3 W.

A1—0 to 3 inches; reddish yellow (7.5YR 6/6) sandy loam, strong brown (7.5YR 5/6) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine irregular pores; mildly alkaline; abrupt smooth boundary.

A2—3 to 13 inches; brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine irregular pores; moderately alkaline; clear smooth boundary.

Bt—13 to 25 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine roots; common fine irregular pores; few thin clay films on faces of peds and bridging sand grains; moderately alkaline; abrupt smooth boundary.

Bk1—25 to 37 inches; reddish yellow (7.5YR 6/6) sandy

loam, strong brown (7.5YR 5/6) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; common fine irregular pores; strongly effervescent; common medium irregular soft masses of calcium carbonate; moderately alkaline; gradual smooth boundary.

Bk2—37 to 60 inches; reddish yellow (7.5YR 7/6) sandy loam, reddish yellow (7.5YR 6/6) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few fine irregular pores; strongly effervescent; common medium irregular soft masses of calcium carbonate; moderately alkaline.

The A horizon has hue of 5YR or 7.5YR, value of 5 to 7 (4 or 5 moist), and chroma of 4 to 6. The Bt horizon is sandy loam or fine sandy loam. It has hue of 5YR or 7.5YR, value of 4 to 6 dry or moist, and chroma of 3 to 6. The Bk horizon is sandy loam or fine sandy loam. It has hue of 5YR or 7.5YR, value of 6 to 8 (4 to 7 moist), and chroma of 4 to 6.

Silkie Series

The soils in the Silkie series are classified as fine, mixed, mesic Vertic Haplustalfs. These deep, well drained soils formed in alluvium derived dominantly from shale. They are on valley sides. Slope is 3 to 10 percent. Elevation is 6,600 to 7,500 feet. The average annual precipitation is 13 to 16 inches. The average annual air temperature is 47 to 51 degrees F, and the frost-free period is 100 to 120 days.

Typical pedon of Silkie clay loam, in an area of Catman-Silkie association, 1 to 10 percent slopes; about 0.25 mile east of Crockett Peak; 2,550 feet west and 780 feet north of the southeast corner of sec. 28, T. 8 N., R. 17 W.

A—0 to 4 inches; light yellowish brown (10YR 6/4) clay loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine irregular pores; mildly alkaline; clear smooth boundary.

Bt—4 to 16 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, firm, very sticky and very plastic; common very fine and fine roots; common fine irregular pores; cracks 0.5 to 1.0 inch wide; many thick clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bk1—16 to 35 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; massive; hard, firm, sticky and plastic; few very fine and fine roots; few fine irregular pores; few small slickensides; few cracks 0.5 to 1.0 inch wide; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

Bk2—35 to 60 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; massive; very hard, firm, very sticky and plastic; few very fine roots; few very fine irregular pores; violently effervescent; common medium irregular soft masses of calcium carbonate; mildly alkaline.

Depth to the base of the Bt horizon is 15 to 27 inches. Cracks 0.5 to 1.0 inch wide extend to a depth of 21 to 35 inches. The Bt and Bk horizons are clay or clay loam. The calcium carbonate equivalent in the Bk horizon is 1 to 10 percent.

Skyvillage Series

The soils in the Skyvillage series are classified as loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents. These shallow, well drained soils formed in eolian material derived dominantly from fine grained sandstone. They are on benches and the edges of mesas. Slope is 3 to 40 percent. Elevation is 6,000 to 6,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 150 days.

Typical pedon of Skyvillage sandy loam, in an area of Skyvillage-Rock outcrop-Bond complex, 3 to 40 percent slopes; about 2 miles east of the Lobo Cow Camp; long. 107 degrees 14 minutes 02 seconds W. and lat. 35 degrees 12 minutes 00 seconds N.

A—0 to 4 inches; light yellowish brown (10YR 6/4) sandy loam, yellowish brown (10YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and common very fine roots; few fine irregular pores; slightly effervescent; mildly alkaline; abrupt smooth boundary.

C—4 to 12 inches; yellowish brown (10YR 5/4) sandy loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine and few very fine roots; few fine irregular pores; slightly effervescent; moderately alkaline; abrupt smooth boundary.

2R—12 inches; sandstone.

The depth to bedrock ranges from 10 to 20 inches. The content of rock fragments ranges from 0 to 15 percent in the A and C horizons.

Sparank Series

The soils in the Sparank series are classified as fine, mixed (calcareous), mesic Ustic Torrifluvents. These deep, well drained soils formed in mixed alluvium. They are on valley floors, in drainageways, and on flood plains, valley bottoms, and alluvial fans. Slope is 0 to 3 percent. Elevation is 5,800 to 6,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 120 to 150 days.

Typical pedon of Sparank clay loam, in an area of Sparank-San Mateo complex, 0 to 5 percent slopes; about 1 mile east of Grants; 900 feet east and 200 feet north of the southwest corner of sec. 28, T. 11 N., R. 9 W.

A—0 to 2 inches; light yellowish brown (2.5Y 6/4) clay loam, olive brown (2.5Y 4/4) moist; strong fine granular structure; soft, friable, sticky and slightly plastic; few very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C1—2 to 21 inches; light yellowish brown (2.5Y 6/4) silty clay, olive brown (2.5Y 4/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine irregular pores; few small slickensides; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C2—21 to 42 inches; light olive brown (2.5Y 5/4) silty clay, olive brown (2.5Y 4/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C3—42 to 46 inches; light olive brown (2.5Y 5/4) silty clay, olive brown (2.5Y 4/4) moist; massive; hard, firm, sticky and plastic; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C4—46 to 60 inches; light olive brown (2.5Y 5/4) silty clay, olive brown (2.5Y 4/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline.

The soils are mildly alkaline to strongly alkaline throughout. Electrical conductivity ranges from 2 to 16 millimhos per centimeter, and the sodium adsorption ratio is 0 to 13 or more.

The A horizon is clay loam or sandy clay loam. It has hue of 10YR or 2.5YR, value of 5 or 6 (4 or 5 moist), and chroma of 3 or 4. The C horizon dominantly is clay, silty clay, or silty clay loam. In some pedons, however, it has thin strata of loamy sand or silt loam in the lower part. This horizon has hue of 10YR or 2.5Y, value of 5 or 6 (4 or 5 moist), and chroma of 3 or 4.

Sparham Series

The soils in the Sparham series are classified as fine, mixed (calcareous), mesic Typic Ustifluvents. These deep, somewhat poorly drained soils formed in mixed alluvium. They are on flood plains. Slope is 0 to 2 percent. Elevation is 6,200 to 6,600 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Sparham clay loam, 0 to 2 percent slopes; about 3 miles west of Santa Maria Mission; 200 feet east and 1,900 feet south of the northwest corner of sec. 30, T. 10 N., R. 8 W.

A—0 to 10 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; strong fine granular structure; soft, friable, sticky and slightly plastic; few very fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C1—10 to 44 inches; pale brown (10YR 6/3) silty clay, brown (10YR 5/3) moist; massive; very hard, very firm, very sticky and very plastic; few very fine roots; few very fine irregular pores; slightly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C2—44 to 60 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine irregular pores; mildly alkaline.

The C horizon is silty clay or clay. Electrical conductivity ranges from 4 to 16 millimhos per centimeter.

Stout Series

The soils in the Stout series are classified as loamy, mixed, nonacid, frigid Lithic Ustorthents. These very shallow and shallow, well drained soils formed in eolian material derived dominantly from sandstone. They are on hills and ridges. Slope is 3 to 15 percent. Elevation is 7,800 to 8,500 feet. The average annual precipitation is 20 to 24 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Stout sandy loam, in an area of Rock outcrop-Stout complex, 3 to 15 percent slopes;

about 3 miles southwest of Page; 900 feet west and 1,000 feet north of the southeast corner of sec. 7, T. 12 N., R. 15 W.

Oi—1 inch to 0; partially decomposed pine needles and oak leaves.

A—0 to 3 inches; brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist; moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; common very fine irregular pores; about 10 percent gravel; neutral; clear smooth boundary.

C—3 to 14 inches; brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine roots; few very fine irregular pores; about 10 percent gravel; neutral; abrupt wavy boundary.

2R—14 inches; sandstone.

The depth to bedrock is 6 to 20 inches. The content of rock fragments averages less than 15 percent in the A and C horizons.

Suwanee Series

The soils in the Suwanee series are classified as fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents. These deep, well drained soils formed in mixed alluvium. They are on flood plains, in drainageways, and on alluvial fans. Slope is 1 to 5 percent. Elevation is 5,400 to 6,000 feet. The average annual precipitation is 7 to 10 inches. The average annual air temperature is 51 to 55 degrees F, and the frost-free period is 140 to 165 days.

Typical pedon of Suwanee silty clay loam, in an area of Navajo-Suwanee complex, 1 to 5 percent slopes; about 4 miles south of the intersection of New Mexico Highway 6 and Interstate 40; about 1,320 feet east and 1,056 feet north of the southwest corner of sec. 19, T. 8 N., R. 3 W.

A—0 to 3 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C1—3 to 16 inches; yellowish red (5YR 5/6) silty clay loam, yellowish red (5YR 4/6) moist; massive; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C2—16 to 21 inches; reddish brown (5YR 5/4) silt loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and medium roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C3—21 to 27 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, sticky and slightly plastic; few fine and medium roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C4—27 to 32 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C5—32 to 35 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine and medium roots; few very fine irregular pores; violently effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C6—35 to 38 inches; brown (7.5YR 5/4) loamy fine sand, dark brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and medium roots; few fine irregular pores; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C7—38 to 46 inches; reddish brown (5YR 5/4) silt loam, reddish brown (5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine, fine, and medium roots; few very fine irregular pores; violently effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C8—46 to 60 inches; reddish brown (5YR 4/4) silty clay, dark reddish brown (5YR 3/4) moist; massive; hard, firm, sticky and plastic; few very fine, fine, and medium roots; few very fine irregular pores; violently effervescent; disseminated calcium carbonate; mildly alkaline.

The C horizon is stratified silty clay loam, silt loam, sandy loam, silty clay, clay loam, sandy clay loam, or loamy fine sand. The content of clay in this horizon ranges from 18 to 35 percent.

Tanbark Series

The soils in the Tanbark series are classified as loamy, gypsic, mesic, shallow Ustic Torriorthents. These shallow, well drained soils formed in eolian material

derived dominantly from gypsum. They are on hills and ridges. Slope is 25 to 60 percent. Elevation is 5,800 to 6,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Tanbark loam, in an area of Winona-Tanbark-Rock outcrop association, 15 to 60 percent slopes; about 15 miles southeast of Chicken Mountain; 1,500 feet west and 2,380 feet south of the northeast corner of sec. 1, T. 4 N., R. 5 W.

A—0 to 2 inches; very pale brown (10YR 8/4) loam, very pale brown (10YR 7/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine irregular pores; about 10 percent gravel; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

C1—2 to 12 inches; very pale brown (10YR 8/3), gypsiferous silt loam, very pale brown (10YR 7/3) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few medium roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate; mildly alkaline; clear smooth boundary.

C2—12 to 17 inches; white (10YR 8/2), gypsiferous sandy loam, very pale brown (10YR 7/4) moist; massive; soft, very friable, nonsticky and nonplastic; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

2Cr—17 inches; white (10YR 8/2) gypsum.

The depth to gypsum is 10 to 20 inches. The C horizon is gypsiferous silt loam or loam in the upper part and gypsiferous sandy loam in the lower part.

Tapia Series

The soils in the Tapia series are classified as fine-loamy, mixed, mesic Ustollic Haplargids. These deep, well drained soils formed in mixed alluvium. They are on fan terraces. Slope is 1 to 5 percent. Elevation is 6,200 to 6,900 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 120 to 150 days.

Typical pedon of Tapia sandy loam, 1 to 5 percent slopes; about 3 miles northeast of Cubero; long. 107 degrees 30 minutes 05 seconds W. and lat. 35 degrees 07 minutes 59 seconds N.

A—0 to 4 inches; brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine irregular pores; about 3 percent gravel; mildly alkaline; abrupt smooth boundary.

Bt1—4 to 9 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate fine subangular blocky structure; slightly hard, firm, sticky and plastic; common very fine and fine roots; common very fine tubular pores; few thin clay films on faces of peds and in pores; about 5 percent gravel; mildly alkaline; clear smooth boundary.

Bt2—9 to 16 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/4) moist; moderate medium subangular blocky structure; slightly hard, firm, sticky and plastic; common very fine and fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 10 percent gravel; slightly effervescent; mildly alkaline; abrupt smooth boundary.

Btk—16 to 23 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; weak fine subangular blocky structure; slightly hard, firm, sticky and slightly plastic; common very fine and few fine roots; common very fine irregular pores; few thin clay films on faces of peds and in pores; about 10 percent gravel; violently effervescent; many medium irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk1—23 to 40 inches; very pale brown (10YR 7/3) cobbly sandy loam, yellowish brown (10YR 5/4) moist; massive; hard, firm, nonsticky and nonplastic; few very fine and fine roots; common very fine irregular pores; about 15 percent cobbles and 20 percent gravel; violently effervescent; weakly cemented in the upper part; many medium irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—40 to 60 inches; very pale brown (10YR 7/4) cobbly sand, dark yellowish brown (10YR 4/4) moist; massive; hard, firm, nonsticky and nonplastic; few very fine and fine roots; common very fine irregular pores; about 15 percent cobbles and 20 percent gravel; violently effervescent; many medium irregular soft masses of calcium carbonate; moderately alkaline.

Depth to the base of the Bt horizon is 19 to 30 inches. The content of rock fragments ranges from 0 to 15 percent in the upper 20 inches and from 25 to 50 percent below that depth. The upper part of the Bk horizon is cobbly sandy loam or very cobbly sandy clay loam.

Techado Series

The soils in the Techado series are classified as clayey, mixed, nonacid, frigid, shallow Typic Ustorthents. These shallow, well drained soils formed in alluvium and colluvium derived dominantly from shale and sandstone. They are on hills, ridges, and mountains. Slope is 5 to 55 percent. Elevation is 7,200 to 8,900 feet. The average annual precipitation is 16 to 22 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Techado channery clay loam, in an area of Valnor-Techado association, 2 to 25 percent slopes; about 5 miles south of Cebollita Peak; 2,375 feet east and 25 feet south of the northwest corner of sec. 19, T. 5 N., R. 9 W.

A—0 to 3 inches; light olive brown (2.5Y 5/4) channery clay loam, olive brown (2.5Y 4/4) moist; strong fine granular structure; soft, friable, sticky and plastic; few very fine and fine roots; common fine irregular pores; about 25 percent channers; neutral; abrupt smooth boundary.

C—3 to 16 inches; light olive brown (2.5Y 5/4) clay, olive brown (2.5Y 4/4) moist; massive; very hard, very firm, very sticky and very plastic; common very fine and few fine, medium, and coarse roots; common very fine irregular pores; about 10 percent channers; neutral; clear smooth boundary.

2Cr—16 inches; soft shale interbedded with sandstone.

The depth to soft shale ranges from 10 to 20 inches. The A horizon is channery or cobbly clay loam. It has hue of 2.5Y or 10YR and value of 4 or 5 (3 or 4 moist). The content of rock fragments in this horizon ranges from 15 to 35 percent, by volume. The C horizon is clay, clay loam, or sandy clay. It has hue of 2.5Y or 10YR, value of 4 or 5 (3 or 4 moist), and chroma of 2 to 4. The content of rock fragments in this horizon ranges from 0 to 15 percent, by volume.

Teco Series

The soils in the Teco series are classified as fine, mixed, mesic Aridic Haplustalfs. These deep, well drained soils formed in mixed alluvium and wind-modified alluvium. They are on mesas, ridges, and hills and in valleys and swales. Slope is 1 to 10 percent. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 115 to 135 days.

Typical pedon of Teco fine sandy loam, in an area of Teco-Atarque association, 1 to 8 percent slopes; about 7 miles west of Atarque Lake; 320 feet south and 2,300 feet east of the northwest corner of sec. 2, T. 6 N., R. 20 W.

A1—0 to 4 inches; light brown (7.5YR 6/4) fine sandy loam, dark brown (7.5YR 4/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; neutral; clear smooth boundary.

A2—4 to 6 inches; light brown (7.5YR 6/4) fine sandy loam, brown (7.5YR 5/4) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; few very fine irregular pores; neutral; abrupt smooth boundary.

Bt1—6 to 9 inches; reddish brown (5YR 4/4) clay loam, reddish brown (5YR 4/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; few fine tubular pores; few thin clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt2—9 to 15 inches; reddish brown (5YR 4/4) clay loam, reddish brown (5YR 4/4) moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; common fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Btk—15 to 24 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; few fine tubular pores; slightly effervescent; few fine irregular seams and filaments of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk1—24 to 29 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 5/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine irregular pores; strongly effervescent; disseminated calcium carbonate and many coarse irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk2—29 to 41 inches; pink (7.5YR 7/4) clay loam, light brown (7.5YR 6/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; about 10 percent gravel; violently effervescent; disseminated calcium carbonate and many coarse irregular soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

Bk3—41 to 60 inches; reddish yellow (7.5YR 6/6) gravelly sandy loam, strong brown (7.5YR 5/6)

moist; massive; slightly hard, friable, nonsticky and nonplastic; about 30 percent gravel; strongly effervescent; disseminated calcium carbonate and common coarse irregular soft masses of calcium carbonate; moderately alkaline.

Depth to the Bk horizon is 20 to 40 inches. The A horizon is fine sandy loam, clay loam, or sandy loam. It has hue of 7.5YR or 10YR, value of 5 to 7 (4 to 6 moist), and chroma of 3 or 4. The Bt horizon is clay loam, clay, or sandy clay. It has hue of 2.5YR to 7.5YR, value of 4 to 6 (3 to 5 moist), and chroma of 4 to 6. The Bk horizon is clay loam, sandy clay, or sandy clay loam in the fine-earth fraction. It has 5 to 25 percent gravel. It has hue of 2.5YR to 7.5YR, value of 5 to 7 (4 to 6 moist), and chroma of 4 to 6.

Timhus Series

The soils in the Timhus series are classified as loamy-skeletal over fragmental, mixed, mesic Aridic Ustochrepts. These deep, somewhat excessively drained soils formed in alluvial material and windblown volcanic sediments. They are on cinder cones. Slope is 20 to 50 percent. Elevation is 7,400 to 8,100 feet. The average annual precipitation is 14 to 16 inches. The average annual air temperature is 47 to 49 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Timhus extremely gravelly loam, in an area of Timhus-Bandera association, 20 to 50 percent slopes; on the south side of Cerro American; 1,300 feet west and 100 feet north of the southeast corner of sec. 11, T. 8 N., R. 13 W.

A—0 to 5 inches; yellowish brown (10YR 5/4) extremely gravelly loam, dark yellowish brown (10YR 3/4) moist; moderate fine granular structure; slightly hard, friable, slightly sticky and nonplastic; common fine roots; few fine tubular pores; about 70 percent pebble-sized cinders; neutral; abrupt smooth boundary.

Bk1—5 to 13 inches; yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 3/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; common fine and medium roots; common very fine irregular and few fine tubular pores; about 55 percent pebble-sized cinders; slightly effervescent; disseminated calcium carbonate and coatings of calcium carbonate on the underside of cinders; mildly alkaline; clear smooth boundary.

Bk2—13 to 20 inches; light yellowish brown (10YR 6/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; common fine and medium and few coarse roots; common very fine irregular pores; about 50 percent pebble-sized cinders; strongly effervescent; common coarse irregular soft masses of calcium carbonate and coatings of calcium carbonate on cinders; moderately alkaline; abrupt smooth boundary.

Bk3—20 to 29 inches; light yellowish brown (10YR 6/4) extremely gravelly loam, yellowish brown (10YR 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few fine, medium, and coarse roots; common very fine irregular pores; about 65 percent pebble-sized cinders; violently effervescent; many coarse irregular soft masses of calcium carbonate and coatings of calcium carbonate on cinders; moderately alkaline; abrupt smooth boundary.

2C—29 to 60 inches; pebble-sized cinders.

The depth to cinders ranges from 20 to 40 inches. The content of cinders in the 2C horizon is 80 percent or more.

Torreon Series

The soils in the Torreon series are classified as fine, montmorillonitic, mesic Aridic Argiustolls. These deep, well drained soils formed in mixed alluvium and colluvium. They are on hills and ridges. Slope is 15 to 35 percent. Elevation is 6,400 to 7,800 feet. The average annual precipitation is 12 to 16 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 100 to 135 days.

Typical pedon of Torreon very cobbly loam, in an area of Torreon-Rock outcrop-Cabezon complex, 15 to 45 percent slopes; about 0.5 mile west of Chicken Mountain; 2,450 feet west and 1,500 feet south of the northeast corner of sec. 18, T. 5 N., R. 4 W.

A—0 to 2 inches; brown (7.5YR 4/2) very cobbly loam, dark brown (7.5YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine and many very fine roots; common very fine irregular pores; about 5 percent stones, 20 percent cobbles, and 20 percent gravel; neutral; abrupt smooth boundary.

Bt1—2 to 7 inches; brown (7.5YR 4/2) clay loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; few fine and common very fine tubular pores; few moderately thick clay films on faces of peds and in pores; about 5 percent gravel; neutral; clear smooth boundary.

Bt2—7 to 11 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; strong medium subangular blocky structure; hard, firm, very sticky and very plastic; common fine and very fine roots; few fine and common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 5 percent gravel; mildly alkaline; abrupt smooth boundary.

Btk—11 to 25 inches; reddish brown (5YR 5/4) clay, dark reddish brown (5YR 3/4) moist; moderate medium subangular blocky structure; hard, firm, very sticky and very plastic; few fine and very fine roots; few fine and very fine tubular pores; few thin clay films on faces of peds and in pores; about 5 percent gravel; strongly effervescent; few medium irregular soft masses of calcium carbonate; mildly alkaline; clear smooth boundary.

Bk—25 to 60 inches; pinkish white (5YR 8/2) silty clay loam, pinkish gray (5YR 7/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine irregular pores; violently effervescent; many coarse irregular soft masses of calcium carbonate; strongly alkaline.

Trag Series

The soils in the Trag series are classified as fine-loamy, mixed Typic Argiborolls. These deep, well drained soils formed in mixed alluvium and colluvium. They are in valleys and on mountains and benches. Slope is 1 to 30 percent. Elevation is 7,200 to 8,900 feet. The average annual precipitation is 16 to 22 inches. The average annual air temperature is 40 to 46 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Trag loam, 1 to 8 percent slopes; on Mesa Chivato; long. 107 degrees 22 minutes 38 seconds W. and lat. 35 degrees 14 minutes 26 seconds N.

A—0 to 3 inches; brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine and very fine roots; common very fine irregular pores; neutral; abrupt smooth boundary.

Bt1—3 to 7 inches; reddish brown (5YR 4/3) sandy clay loam, dark reddish brown (5YR 3/3) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and few fine and medium roots; few fine and very fine tubular pores; few thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—7 to 15 inches; reddish brown (5YR 4/3) sandy clay loam, dark reddish brown (5YR 3/3) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few medium, fine, and very fine roots; few fine and common very fine tubular pores; common thin clay films on faces of peds and in pores; neutral; abrupt smooth boundary.

Bt3—15 to 24 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few medium, fine, and very fine roots; few fine and common very fine tubular pores; many moderate thick clay films on faces of peds and in pores; mildly alkaline; abrupt smooth boundary.

C1—24 to 36 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 4/4) moist; massive; hard, firm, slightly sticky and nonplastic; few fine roots; few very fine irregular pores; about 5 percent gravel; mildly alkaline; gradual smooth boundary.

C2—38 to 60 inches; light brown (7.5YR 6/4) sandy clay loam, brown (7.5YR 4/4) moist; massive; hard, firm, slightly sticky and nonplastic; few fine roots; few fine irregular pores; about 5 percent gravel; mildly alkaline.

The mollic epipedon ranges from 10 to 15 inches in thickness. The content of rock fragments ranges from 0 to 25 percent throughout the profile.

The A horizon is loam or cobbly loam. It has value of 4 or 5 and chroma of 2 or 3. The Bt horizon is clay loam, cobbly sandy clay loam, or sandy clay loam. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. The C horizon is cobbly sandy clay loam, sandy clay loam, clay loam, or sandy loam. It has hue of 5YR or 7.5YR, value of 4 to 6 (3 or 4 moist), and chroma of 4 or 5.

The Trag soil in map unit 276 is a taxadjunct to the series because it has hue of 5YR, and that in map unit 615 is a taxadjunct because it has more than 15 percent gravel in the particle-size control section. These differences, however, do not significantly affect the use and management of the soils.

Valnor Series

The soils in the Valnor series are classified as fine, mixed Mollic Eutroboralfs. These moderately deep, well drained soils formed in alluvium derived dominantly from interbedded shale and sandstone. They are on mesas, hills, and plateaus. Slope is 2 to 7 percent. Elevation is 7,500 to 8,200 feet. The average annual precipitation is 16 to 20 inches. The average annual air temperature is 40 to 45 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Valnor clay loam, in an area of Valnor-Techado association, 2 to 25 percent slopes; 6.5 miles south of Cebollita Peak; 825 feet west and 1,375 feet north of the southeast corner of sec. 26, T. 5 N., R. 10 W.

A—0 to 2 inches; yellowish brown (10YR 5/4) clay loam, dark brown (10YR 3/3) moist; moderate fine granular structure; soft, friable, sticky and plastic; common fine and very fine roots; common very fine irregular pores; neutral; abrupt smooth boundary.

Bt1—2 to 10 inches; dark yellowish brown (10YR 4/6) clay, dark yellowish brown (10YR 4/4) moist; moderate fine subangular blocky structure; hard, firm, sticky and plastic; common fine and very fine roots; few very fine tubular pores; few thin clay films on faces of peds and in pores; neutral; clear smooth boundary.

Bt2—10 to 18 inches; yellowish brown (10YR 5/4) clay, dark yellowish brown (10YR 4/4) moist; strong medium prismatic structure; very hard, very firm, very sticky and very plastic; few fine and common very fine roots; few very fine tubular pores; common moderately thick clay films on faces of peds and in pores; mildly alkaline; abrupt smooth boundary.

Bk—18 to 38 inches; light yellowish brown (10YR 6/4) clay, olive brown (2.5Y 4/4) moist; massive; very hard, very firm, very sticky and very plastic; few fine and very fine roots; few very fine irregular pores; strongly effervescent; few fine irregular seams and filaments of calcium carbonate; moderately alkaline; gradual smooth boundary.

Cr—38 to 60 inches; shale interbedded with weathered sandstone.

Venadito Series

The soils in the Venadito series are classified as very fine, montmorillonitic, mesic Udorthentic Chromusterts. These deep, well drained soils formed in alluvium derived dominantly from shale. They are fans and in valleys. Slope is 0 to 5 percent. Elevation is 6,200 to 7,500 feet. The average annual precipitation is 10 to 14 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 110 to 140 days.

Typical pedon of Venadito clay loam, in an area of Venadito-Teco association, 0 to 10 percent slopes; about 3 miles north of the headquarters of Atarque Ranch; 500 feet east and 175 feet north of the southwest corner of sec. 19, T. 7 N., R. 18 W.

A—0 to 3 inches; reddish brown (2.5YR 4/4) clay loam, reddish brown (5YR 4/4) moist; moderate fine granular structure; soft, friable, sticky and slightly plastic; few very fine, fine, and coarse roots; few very fine irregular pores; vertical cracks 1.5 inches wide; strongly effervescent; moderately alkaline; abrupt smooth boundary.

C1—3 to 35 inches; reddish brown (2.5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine, fine, and coarse roots; few very fine irregular pores; common intersecting slickensides; vertical cracks 0.25 inch wide; strongly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

C2—35 to 60 inches; reddish brown (2.5YR 5/4) clay, reddish brown (2.5YR 4/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few very fine irregular pores; strongly effervescent; disseminated calcium carbonate; moderately alkaline.

The particle-size control section averages more than 60 percent clay. The A horizon is clay loam, sandy clay loam, or silty clay loam. It has hue of 2.5YR or 5YR, value of 3 or 4 dry or moist, and chroma of 4 to 6. The C horizon has hue of 2.5YR or 5YR, value of 3 to 5 dry or moist, and chroma of 3 to 6.

Venadito Variant

The soils in the Venadito Variant are classified as very fine, montmorillonitic, mesic Udic Chromusterts. These moderately deep, well drained soils formed in mixed alluvium. They are on flood plains and alluvial fans and in valleys. Slope is 0 to 1 percent. Elevation is 6,200 to 6,600 feet. The average annual precipitation is 10 to 13 inches. The average annual air temperature is 48 to 53 degrees F, and the frost-free period is 110 to 140 days.

Typical pedon of Venadito Variant clay loam, 0 to 1 percent slopes; about 0.5 mile north of the village of Bluewater; 2,600 feet west and 2,100 feet north of the southeast corner of sec. 15, T. 12 N., R. 11 W.

Ap—0 to 3 inches; reddish brown (5YR 4/4) clay loam, dark reddish brown (5YR 3/4) moist; moderate fine granular structure; slightly hard, firm, sticky and slightly plastic; few very fine and fine roots; common very fine irregular pores; vertical cracks 1 inch wide; strongly effervescent; disseminated calcium carbonate; neutral; abrupt smooth boundary.

C1—3 to 18 inches; reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few fine irregular pores; vertical

cracks 0.5 inch wide; common intersecting slickensides; strongly effervescent; disseminated calcium carbonate; neutral; clear smooth boundary.

C2—18 to 35 inches; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; massive; very hard, very firm, very sticky and very plastic; few very fine and fine roots; few fine irregular pores; vertical cracks 0.5 inch wide; strongly effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

2R—35 inches; basalt.

Vessilla Series

The soils in the Vessilla series are classified as loamy, mixed (calcareous), mesic Lithic Ustorthents. These very shallow and shallow, well drained soils formed in eolian material and colluvium derived dominantly from sandstone. They are on hills, ridges, and benches. Slope is 3 to 55 percent. Elevation is 6,500 to 7,500 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 110 to 130 days.

Typical pedon of Vessilla sandy loam, in an area of Laporte-Vessilla complex, 3 to 15 percent slopes; about 2.25 miles east of Pueblitos Ruins; 1,600 feet north and 2,260 feet east of the southwest corner of sec. 28, T. 10 N., R. 13 W.

A—0 to 6 inches; brown (7.5YR 4/4) sandy loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; nonsticky and nonplastic; common fine and very fine roots; common very fine irregular pores; about 5 percent gravel; slightly effervescent; mildly alkaline; clear smooth boundary.

C1—6 to 12 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and common very fine roots; common very fine irregular pores; about 5 percent gravel; slightly effervescent; mildly alkaline; clear smooth boundary.

C2—12 to 18 inches; light brown (7.5YR 6/4) sandy loam, brown (7.5YR 5/4) moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine irregular pores; about 10 percent cobbles; slightly effervescent; mildly alkaline; clear smooth boundary.

2R—18 inches; sandstone.

The depth to bedrock ranges from 6 to 20 inches. The content of rock fragments ranges from 5 to 35 percent in the A and C horizons. The A horizon has value of 4 or 5 (3 or 4 moist) and chroma of 4.

Viuda Series

The soils in the Viuda series are classified as clayey, mixed, mesic Lithic Ustollic Haplargids. These shallow, well drained soils formed in alluvium and windblown sediments. They are on benches, hills, and ridges. Slope is 1 to 10 percent. Elevation is 6,500 to 7,000 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Viuda very cobbly sandy loam, in an area of Viuda-Penistaja-Rock outcrop complex, 1 to 10 percent slopes; about 3.25 miles southwest of Four Corners Windmill; 1,040 feet east and 1,200 feet north of the southwest corner of sec. 10, T. 5 N., R. 12 W.

A—0 to 3 inches; brown (7.5YR 5/4) very cobbly sandy loam, dark brown (7.5YR 3/4) moist; moderate fine granular structure; soft, friable, nonsticky and nonplastic; few medium and fine roots; common very fine irregular pores; about 5 percent stones, 20 percent cobbles, and 15 percent gravel; mildly alkaline; abrupt smooth boundary.

Bt—3 to 10 inches; brown (7.5YR 4/4) clay, dark brown (7.5YR 3/4) moist; moderate medium prismatic structure parting to strong medium subangular blocky; very hard, firm, sticky and plastic; few medium and common fine roots; common very fine tubular pores; many moderately thick clay films on faces of peds and in pores; about 5 percent cobbles and 5 percent gravel; slightly effervescent; disseminated calcium carbonate; moderately alkaline; clear smooth boundary.

Btk—10 to 16 inches; brown (7.5YR 5/4) clay, dark brown (7.5YR 4/4) moist; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and in pores; about 5 percent cobbles and 5 percent gravel; strongly effervescent; disseminated calcium carbonate and few fine irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bk—16 to 19 inches; light brown (7.5YR 6/4) cobbly clay loam, brown, (7.5YR 5/4) moist; massive; hard, friable, sticky and plastic; few very fine roots; few very fine irregular pores; about 15 percent cobbles; violently effervescent; common medium irregular soft masses of calcium carbonate; moderately alkaline; abrupt smooth boundary.

2R—19 inches; basalt.

The depth to bedrock is 10 to 20 inches.

The A horizon is very cobbly sandy loam or very

cobbly silty clay loam. It has hue of 10YR or 7.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 3 or 4. The content of rock fragments ranges from 35 to 60 percent.

The Bt horizon is clay or sandy clay. It has hue of 10YR or 7.5YR, value of 4 or 5 (3 or 4 moist), and chroma of 3 or 4. The content of rock fragments ranges from 5 to 15 percent.

The Bk horizon is clay loam, cobbly clay loam, or sandy clay loam. It has hue of 10YR or 7.5YR. The content of rock fragments ranges from 5 to 20 percent.

Warm Springs Series

The soils in the Warm Springs series are classified as fine-loamy, mixed, mesic Aquic Calciustolls. These deep, somewhat poorly drained soils formed in mixed alluvium and lacustrine material. They are in old lakebeds and on flood plains. Slope is 0 to 2 percent. Elevation is 6,300 to 6,600 feet. The average annual precipitation is 12 to 14 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 115 to 135 days.

Typical pedon of Warm Springs loam, 0 to 2 percent slopes; about 0.5 mile northeast of San Rafael; 760 feet west and 430 feet south of the northeast corner of sec. 10, T. 10 N., R. 10 W.

Ap1—0 to 1 inch; brown (10YR 5/3) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common fine irregular pores; violently effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

Ap2—1 to 8 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots; common fine irregular pores; violently effervescent; disseminated calcium carbonate; mildly alkaline; abrupt wavy boundary.

Bk1—8 to 12 inches; light brownish gray (10YR 6/2) gravelly sandy loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and few fine roots; common fine irregular pores; about 20 percent gravel; violently effervescent; disseminated calcium carbonate; moderately alkaline; abrupt smooth boundary.

Bk2—12 to 36 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots; common fine and few very fine irregular pores; violently effervescent; disseminated calcium carbonate and many coarse irregular soft masses and seams of calcium carbonate; strongly alkaline; abrupt smooth boundary.

Bk3—36 to 44 inches; light brownish gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; violently effervescent; disseminated calcium carbonate; strongly alkaline; abrupt smooth boundary.

Bk4—44 to 60 inches; light brownish gray (2.5Y 6/2) sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few fine irregular pores; about 10 percent gravel; violently effervescent; disseminated calcium carbonate; strongly alkaline.

Depth to the water table generally is 12 to 30 inches, but it ranges from 10 to 60 inches. The sodium adsorption ratio in the Bk horizon is more than 13, and the calcium carbonate equivalent is more than 25 percent.

Winona Series

The soils in the Winona series are classified as loamy-skeletal, carbonatic, mesic Lithic Ustollic Calciorthids. These shallow and very shallow, well drained soils formed in windblown sediments derived dominantly from limestone. They are on ridges, hills, benches, and mesa breaks. Slope is 3 to 45 percent. Elevation is 5,800 to 6,800 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 49 to 53 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Winona very gravelly loam, in an area of Winona-Rock outcrop complex, 3 to 20 percent slopes; about 5 miles southeast of the headquarters of Harrington Ranch; 630 feet east and 200 feet south of the northwest corner of sec. 6, T. 6 N., R. 3 W.

A—0 to 3 inches; brown (7.5YR 5/4) very gravelly loam, dark yellowish brown (10YR 4/4) moist; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; few very fine irregular pores; about 40 percent gravel and 10 percent cobbles; violently effervescent; disseminated calcium carbonate; mildly alkaline; abrupt smooth boundary.

Bk1—3 to 7 inches; pale brown (10YR 6/3) very cobbly

loam, dark yellowish brown (10YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few fine and very fine roots; few very fine irregular and few fine tubular pores; about 20 percent cobbles and 20 percent gravel; violently effervescent; many coarse irregular soft masses of calcium carbonate; mildly alkaline; clear smooth boundary.

Bk2—7 to 10 inches; very pale brown (10YR 7/3) very cobbly loam, pale brown (10YR 6/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine and very fine roots; few very fine irregular and few fine tubular pores; about 20 percent cobbles and 20 percent gravel; violently effervescent; many coarse irregular soft masses of calcium carbonate; mildly alkaline; abrupt smooth boundary.

2R—10 inches; limestone.

The depth to bedrock ranges from 5 to 20 inches. The content of limestone gravel and cobbles ranges from 35 to 55 percent in the A and Bk horizons.

The A horizon has hue of 7.5YR or 10YR and value of 4 to 6 (3 or 4 moist). The Bk horizon has value of 5 to 7 (4 to 6 moist) and chroma of 3 or 4.

Yankee Series

The soils in the Yankee series are classified as fine, mixed Vertic Argiborolls. These deep, well drained soils formed in mixed alluvium. They are in valleys. Slope is 0 to 3 percent. Elevation is 7,700 to 8,300 feet. The average annual precipitation is 20 to 24 inches. The average annual air temperature is 40 to 44 degrees F, and the frost-free period is 90 to 110 days.

Typical pedon of Yankee silty clay loam, 0 to 3 percent slopes; about 4.25 miles southwest of Page; 200 feet east and 550 feet north of the southwest corner of sec. 18, T. 12 N., R. 15 W.

A—0 to 3 inches; dark reddish brown (5YR 3/2) silty clay loam, dark reddish brown (5YR 2/2) moist; strong very fine granular structure; soft, very friable, sticky and slightly plastic; many very fine roots; common very fine irregular pores; neutral; clear smooth boundary.

Bt1—3 to 11 inches; dark reddish brown (5YR 3/2) silty clay, dark reddish brown (5YR 2/2) moist; strong very fine angular blocky structure; hard, firm, very sticky and plastic; few very fine roots; few very fine tubular pores; vertical cracks 0.5 to 1.0 inch wide; many thick clay films on faces of peds and in pores; mildly alkaline; clear smooth boundary.

Bt2—11 to 28 inches; dark reddish gray (5YR 4/2) silty clay, dark reddish brown (5YR 3/2) moist; strong coarse prismatic structure; hard, firm, very sticky and plastic; few very fine roots; few very fine tubular pores; vertical cracks 0.5 to 1.0 inch wide; many thick clay films on faces of peds and in pores; slightly effervescent; moderately alkaline; gradual smooth boundary.

Bt3—28 to 60 inches; reddish brown (5YR 4/3) silty clay, dark reddish brown (5YR 2/2) moist; strong coarse prismatic structure; hard, firm, very sticky and plastic; few very fine roots; few very fine tubular pores; many thick clay films on faces of peds and in pores; slightly effervescent; moderately alkaline.

The mollic epipedon ranges from 30 to 57 inches in thickness. Vertical cracks 0.5 to 1.0 inch wide extend to a depth of 20 to 30 inches.

The Yankee soils in this survey area receive more precipitation than is defined as the range for the series. This difference, however, does not significantly affect the use and management of the soils.

Zia Series

The soils in the Zia series are classified as coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents. These deep, well drained soils formed in wind-modified alluvium derived dominantly from sandstone. They are on fan terraces and valley sides. Slope is 3 to 5 percent. Elevation is 6,000 to 6,500 feet. The average annual precipitation is 10 to 12 inches. The average annual air temperature is 48 to 52 degrees F, and the frost-free period is 120 to 140 days.

Typical pedon of Zia fine sandy loam, 3 to 5 percent slopes; about 0.75 mile southwest of Santa Maria Mission; 500 feet north and 2,200 feet east of the southwest corner of sec. 28, T. 10 N., R. 8 W.

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) fine sandy loam, dark brown (10YR 4/3) moist; weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and few fine roots; common very fine irregular pores; slightly effervescent; disseminated calcium carbonate; moderately alkaline; gradual wavy boundary.

C1—8 to 47 inches; brown (7.5YR 5/4) fine sandy loam, dark brown (7.5YR 4/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine irregular pores; slightly effervescent; few fine irregular seams and soft masses of calcium carbonate; moderately alkaline; clear smooth boundary.

C2—47 to 60 inches; yellow (10YR 7/6) fine sandy loam, very pale brown (10YR 7/4) moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine irregular pores; violently effervescent; few fine irregular seams and soft masses of calcium carbonate; moderately alkaline.

The C horizon is fine sandy loam or sandy loam.

Formation of the Soils

Soil is unconsolidated mineral or organic material that supports plants *(12)*. An individual soil is three-dimensional. The shape and size of individual bodies of soil commonly are related to the shape and characteristics of the landforms.

Soil is the natural result of the interaction of five soil-forming factors—parent material, living organisms, climate, topography, and time. The effect of any one factor is dependent on the other four factors. Changes in climate, vegetation, and land use all affect soil formation.

Parent Material

Few soils, if any, are static. Soils are a product of the addition and removal of material as influenced by the other soil-forming factors.

Dust blown onto the surface or deposited by rainfall adds mineral material that affects soil formation. Some of these deposits contain calcium carbonate that is added to the soils. Some soils also receive annual or more frequent deposits of sediment carried by overland flow.

Soil blowing and water erosion can remove soil material as fast or faster than it is deposited. Soil blowing removes only the smaller sized particles from the surface, leaving a gravelly desert pavement that is resistant to further wind action.

Water erosion can occur in the form of sheet, rill, or gully erosion. The material can be transported only a few inches or many miles. It may be sorted or mixed with other material and redeposited. It may be deposited in large enough quantities to be considered parent material or such small quantities that it only offsets a slight loss of material on a relatively stable soil.

The soils in the survey area formed in material weathered from rocks that range in age from late Precambrian to Quaternary. The material includes intrusive and volcanic igneous rock, sedimentary rock, and metamorphic rock. The numerous kinds of rock and their varying ages have resulted in the formation of many different kinds of soil.

Soils that formed in material weathered from rocks of the Quaternary include those of the Aparejo, Navajo, and Venadito series, which are on flood plains and in valleys that receive sediment during periods of flooding, and those of the Pojoaque and Rana series, which are on mesa breaks.

Soils that formed in material weathered from rocks of the Tertiary, including basalt flows and rhyolite, are those of the Berto, Flaco, Kiki, and Viuda series. Scattered areas of these soils are throughout the survey area.

Soils that formed in material weathered from rocks of the Cretaceous, Jurassic, and Triassic are those of the Atarque, Bond, Galestina, Hagerman, Montecito, Penistaja, Pinitos, and Teco series. These rocks are Dakota Sandstone, Gallup Sandstone, Mancos Shale, the Morrison Formation, and Zuni Sandstone *(4)*.

Soils that formed in material weathered from rocks of the Precambrian include those of the Mirabal series. These rocks are mainly granitic and are in the Zuni Mountains.

The method of deposition and the type of rock influence the texture of the parent material. The material deposited by slowly moving water passing through an area of shale may be fine textured clay, but that deposited by rapidly moving streams near areas of granite may be very gravelly and cobbly. Wind- and water-deposited material derived from sandstone commonly is sandy. The texture of the parent material considerably affects the permeability, available water capacity, rooting depth, and chemical characteristics of a soil.

Living Organisms

Plant and animal life on and in the soil affects soil formation. Organic material, such as leaves, branches, logs, stems, and decaying roots, is added to the soil, and a multitude of micro-organisms in the soil act on the material. Insects and burrowing animals mix the soil. The larger animals trample the soil. The trampling breaks up the surface crust and allows more moisture to enter the soil. Animals also add organic matter and

other nutrients. Human beings apply fertilizer, soil amendments, and other material to the soil and extract products from it. All of these activities alter the nature of the soil.

The influence of human activities on the formation of the soils in the survey area generally has been minimal. It has been significant, however, in areas of irrigated cropland, in urban areas, and in areas that have been mined for uranium. These activities have depleted some plant nutrients and added others, such as waste products from livestock enterprises, commercial fertilizer, garbage, and green manure crops. In some areas erosion has occurred as a result of overgrazing.

The soils in the survey area support several types of vegetation. Each type has a specific influence on soil formation. In the southeastern part of the area, the vegetation is mainly desert shrubs and warm-season grasses. Precipitation is low in this area, and plant growth is not so vigorous as it is in the cooler, north-central part of the survey area. Grieta, Kiki, Suwanee, and Navajo are examples of soils that support this type of vegetation. These soils have a low content of organic matter.

In the north-central part of the survey area, the vegetation is mainly pinyon, juniper, ponderosa pine, cool-season grasses, and shrubs. Precipitation is higher in this area than in other parts of the survey area, and the rate of evaporation is lower. The plants grow more vigorously and produce more litter. Manzano, McGaffey, Millpaw, Moreno, and Saladon are examples of soils that support these plants. These soils have a higher content of organic matter than the soils in other parts of the survey area.

Topography

Topography affects soil formation through its influence on drainage, erosion, canopy cover, and soil temperature. Generally, the shallower soils that have less distinct horizons are in steep areas on ridges. Runoff is rapid in these areas. These soils exhibit little profile development because soil material is eroded away faster than the soils can form. The deeper soils that have distinct horizons are in gently sloping areas. Runoff is slow in these areas. These soils lose only small amounts of soil material through water erosion. Alluvial material is deposited on the nearly level soils on flood plains so frequently that distinct horizons cannot form.

Relief and surface drainage are closely related. Relief varies in the survey area. The main drainageways are the Rio Pescado, the Rio Puerco, and the Rio San Jose and numerous arroyos and washes. The Rio Pescado drains the west-central part of the survey area, the Rio San Jose drains the area north of Interstate 40, and the Rio Puerco drains the northeastern part of the survey area.

Soils on south and west aspects are warmer than soils on north and east aspects and have a higher evaporation rate. As a result, they support less vegetation, are more susceptible to erosion, and exhibit less profile development.

Climate

Climate is a major factor of soil formation in this survey area. Temperature, precipitation, humidity, and wind affect vegetation, parent material, and soil drainage. Generally, precipitation and humidity increase and temperature decreases as elevation increases.

The climate in the survey area is highly varied because of the wide range in elevation and the uneven topography. Elevation ranges from 5,250 feet near the Rio Puerco to 10,300 feet north of Water Canyon, near Mount Taylor. The average annual temperature ranges from about 38 to 55 degrees F, and the average annual precipitation ranges from 7 to 25 inches. About 50 percent of the precipitation falls during brief, generally heavy thunderstorms in the period July through September. Much of the precipitation runs off the more sloping soils because of the intensity of the storms. All of the soils in the survey area can receive and absorb the moisture from gentle rains, but heavy rainfall is concentrated in the nearly level areas. The soils in these areas are leached of soluble salts to a greater depth than the soils in other areas. Also, they support more lush vegetation.

Time

Soils form over a long period of time. The length of time that the other soil-forming factors have been acting on the parent material generally is evidenced by the soil profile. As the length of time increases, the development of the profile becomes more apparent. Calcium carbonate and very fine clay may be leached downward and may accumulate in the underlying layers.

In this survey area, most of the irrigated soils are on flood plains and alluvial fans. These soils generally are deep, are slowly permeable, and have ample plant nutrients. They have few apparent horizons other than those having accumulations of organic matter.

Sparank, Venadito, Aparejo, and San Mateo are examples of soils that exhibit little or no profile development. The parent material has been altered very little. Manzano, McGaffey, and Winona soils show

evidence of some profile development. Soluble salts have been leached from the upper part of these soils, and distinct horizons are recognizable. Flugle, Goesling, Montecito, and Teco soils are highly developed. The soluble salts have been leached from the upper part of the profile, and clay has formed and accumulated in the lower part.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Arroyo. The flat-floored channel of an ephemeral stream, commonly with very steep to vertical banks cut in alluvium.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3.5
Low	3.5 to 5.0
Moderate	5.0 to 7.5
High	7.5 to 10.0
Very high	more than 10.0

Back slope. The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Back slopes in profile are commonly steep, are linear, and may or may not include cliff segments.

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable

for reseeding or to reduce or eliminate competition from woody vegetation and thus to allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion or an exposed volcanic neck.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Canyon. A long, deep, narrow, very steep sided valley with high, precipitous walls in an area of high local relief.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax plant community. The plant community on a given site that will be established if present environmental conditions continue to prevail and the site is properly managed.

Coarse fragments. Mineral or rock particles larger than 2 millimeters in diameter.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use

of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—Readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—Adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

Cuesta. An asymmetric, homoclinal ridge capped by resistant rock layers of slight or moderate dip.

Culmination of the mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth, soil. The thickness of weathered soil material overlying bedrock. The depth classes recognized in this survey area are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	more than 40 inches

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Desert pavement. A layer of gravel or coarser fragments on a desert surface that was emplaced by upward movement of fragments from underlying sediment or remains after finer particles have been removed by running water or the wind.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming with the dip of underlying bedded rock.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—These soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained.—These soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained.—These soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained.—These soils are wet

close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained.—These soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained.—These soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained.—These soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except for rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley, generally more open and with broader bottom land than a ravine or gulch.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Flaggy soil material. Material that is, by volume, 15 to

35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gullied land. Areas where erosion has resulted in a network of V- or U-shaped channels. Gullied land resembles small areas of badland.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Gypsum land. Exposures of nearly pure, soft gypsum. The surface generally is very unstable and erodes easily. Trafficability is very poor.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the

material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Light textured soil. Sand or loamy sand.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by the wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until

the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mesa. A broad, nearly flat topped and commonly isolated upland mass characterized by summit widths that are more than the heights of bounding erosional scarps.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides and considerable bare-rock surface. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting around ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of

moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressional areas, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability or an impermeable layer near the surface, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata mainly red in color and composed largely of sandstone and shale.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Ridge. A long and narrow, generally sharp-crested land surface that has steep sides and forms on uplands between valleys. Ridges are in areas of hills and mountains.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Riverwash. Unstabilized sandy, silty, clayey, or gravelly sediments in areas that are flooded, washed, and reworked by rivers so frequently that they support little or no vegetation.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site class. A grouping of site indexes into five to seven production capability levels. Each level can be represented by a site curve.

Site curve (100-year). A set of related curves on a graph that shows the average height of dominant and codominant trees for a range of ages on soils that differ in productivity. Each level is represented by a curve. The basis of the curves is the height of dominant and codominant trees that are 100 years old or are 100 years old at breast height.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^{+} to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 6 to 15 inches (15 to 38 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Tailwater. The water just downstream of a structure.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Too arid (in tables). The soil is dry most of the time, and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The action of uprooting and tipping over trees by the wind.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1953-90 at Grants, New Mexico, and 1949-90 at Laguna, New Mexico)

Month	Temperature		Precipitation	
	Average daily maximum	Average daily minimum	Average monthly total	Average number of days with 0.10 inch or more
	^oF	^oF	In	
GRANTS:				
January	44.6	13.7	0.47	1
February	50.0	18.0	.46	1
March	56.6	23.2	.46	1
April	66.4	29.6	.41	1
May	74.9	38.2	.48	1
June	85.3	47.2	.57	1
July	87.0	55.0	1.83	4
August	83.8	52.6	2.02	5
September	78.5	44.2	1.35	3
October	68.1	32.7	1.14	2
November	55.3	22.0	.51	1
December	46.3	14.4	.60	2
Year	66.4	32.6	10.30	23
LAGUNA:				
January	47.5	18.8	0.40	1
February	52.8	22.3	.44	1
March	59.6	27.3	.41	1
April	69.0	34.2	.39	1
May	77.8	42.9	.59	1
June	88.3	52.3	.44	1
July	90.5	58.8	1.66	4
August	87.4	57.1	1.80	5
September	81.5	48.9	1.17	3
October	71.2	37.6	1.15	2
November	58.2	26.6	.33	1
December	49.0	19.4	.49	1
Year	69.4	37.2	9.27	22

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Cibola	Mckinley	Valencia	Total-- Area	Extent
		Acres	Acres	Acres	Acres	Pct
10	Lava flows	98,488	0	0	98,488	3.8
20	Penistaja fine sandy loam, 1 to 3 percent slopes	7,496	0	0	7,496	0.3
21	Clovis sandy clay loam, 1 to 3 percent slopes	817	0	0	817	*
25	Hickman-Catman complex, 1 to 6 percent slopes	53,388	65	0	53,453	2.0
30	Warm Springs loam, 0 to 2 percent slopes	2,163	0	0	2,163	0.1
40	Aparejo clay loam, 0 to 1 percent slopes	1,493	0	0	1,493	0.1
41	Aparejo clay loam, sandy substratum, 0 to 1 percent slopes	1,993	0	0	1,993	0.1
45	Aparejo clay, 0 to 1 percent slopes	1,250	0	0	1,250	*
50	Venadito clay loam, 0 to 1 percent slopes	4,385	0	0	4,385	0.2
51	Venadito sandy clay loam, 0 to 1 percent slopes	625	0	0	625	*
52	Venadito Variant clay loam, 0 to 1 percent slopes	780	0	0	780	*
55	Glenberg-San Mateo complex, 0 to 2 percent slopes	1,250	0	0	1,250	*
56	Mespun loamy sand, 1 to 5 percent slopes	650	0	0	650	*
57	San Mateo clay loam, 1 to 3 percent slopes	3,189	0	0	3,189	0.1
58	San Mateo sandy clay loam, 1 to 3 percent slopes	1,885	0	0	1,885	0.1
60	Sparank clay loam, 1 to 3 percent slopes	4,038	0	0	4,038	0.1
61	Sparham clay loam, 0 to 2 percent slopes	906	0	0	906	*
62	Sparank sandy clay loam, saline, sodic, 1 to 3 percent slopes	4,531	0	0	4,531	0.2
66	Zia fine sandy loam, 3 to 5 percent slopes	355	0	0	355	*
70	Catman clay loam, 1 to 3 percent slopes	0	677	0	677	*
72	Catman Variant clay loam, 1 to 3 percent slopes	0	305	0	305	*
73	Catman sandy clay loam, 1 to 3 percent slopes	0	319	0	319	*
75	Hickman sandy clay loam, 1 to 3 percent slopes	0	233	0	233	*
100	Manzano loam, 1 to 5 percent slopes	1,987	0	0	1,987	0.1
120	Rock outcrop-Laporte complex, 30 to 60 percent slopes	12,132	0	0	12,132	0.4
130	Laporte-Rock outcrop complex, 3 to 20 percent slopes	36,375	0	0	36,375	1.3
200	Penistaja fine sandy loam, 2 to 10 percent slopes	71,754	0	1,202	72,956	2.8
205	Ildefonso very gravelly sandy loam, 3 to 15 percent slopes	850	0	0	850	*
210	Bond-Penistaja-Rock outcrop complex, 2 to 15 percent slopes	6,283	0	276	6,559	0.2
218	Viuda-Penistaja-Rock outcrop complex, 1 to 10 percent slopes	66,325	0	0	66,325	2.5
230	Dumps-Pits complex	6,609	0	0	6,609	0.2
251	Skyvillage-Rock outcrop-Bond complex, 3 to 40 percent slopes	34,603	0	1,205	35,808	1.3
257	Sparank-San Mateo complex, 0 to 5 percent slopes	78,559	0	2,389	80,948	3.0
259	Mikim loam, 1 to 5 percent slopes	17,155	0	367	17,522	0.6
262	Poley-Pojoaque very cobbly loams, 5 to 30 percent slopes	42,119	0	0	42,119	1.6
264	Tapia sandy loam, 1 to 5 percent slopes	2,793	0	0	2,793	0.1
270	Charo loam, 0 to 5 percent slopes	14,388	0	0	14,388	0.5
272	Cebolleta-Borrego-Rock outcrop complex, 1 to 15 percent slopes	11,601	0	0	11,601	0.4
276	Trag loam, 1 to 8 percent slopes	2,494	0	0	2,494	0.1
278	Microy-Rock outcrop complex, 5 to 30 percent slopes	4,320	0	0	4,320	0.2
282	Cebolleta cobbly loam, 2 to 10 percent slopes, very stony	9,151	0	0	9,151	0.3
284	Cebolleta-Rock outcrop complex, 15 to 50 percent slopes	15,655	0	0	15,655	0.6
286	Cebolleta-Raton complex, 1 to 5 percent slopes	3,197	0	0	3,197	0.1
290	Paguate-Hackroy complex, 1 to 5 percent slopes	20,624	0	0	20,624	0.8
291	Paguate cobbly clay loam, 1 to 5 percent slopes	41,679	0	0	41,679	1.5
294	Parkay-Rock outcrop complex, 15 to 45 percent slopes	7,413	0	0	7,413	0.3
300	Saladon clay loam, 0 to 5 percent slopes	651	0	0	651	*
310	Mirabal very gravelly loam, 2 to 15 percent slopes	5,925	0	0	5,925	0.2

See footnote at end of table.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Cibola	Mckinley	Valencia	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Pct
315	Abersito, cobbly-Abersito-Rock outcrop association, 5 to 30 percent slopes	5,664	0	0	5,664	0.2
320	Cinnadale gravelly very fine sandy loam, 1 to 15 percent slopes	10,037	0	0	10,037	0.4
325	Moreno Variant loam, 2 to 10 percent slopes	542	0	0	542	*
330	Moreno loam, 1 to 10 percent slopes	1,895	0	0	1,895	0.1
340	Yankee silty clay loam, 0 to 3 percent slopes	551	0	0	551	*
350	Rock outcrop-Stout complex, 3 to 15 percent slopes	6,634	0	0	6,634	0.2
406	Poley-Rock outcrop complex, 2 to 25 percent slopes	48,908	0	7,469	56,377	2.1
407	Viuda-Rock outcrop complex, 1 to 10 percent slopes	6,357	0	0	6,357	0.2
419	Navajo silty clay loam, 1 to 5 percent slopes	14,969	0	3,298	18,267	0.7
420	Navajo-Suwanee complex, 1 to 5 percent slopes	52,584	0	7,344	59,928	2.2
424	Mespun-Palma association, 1 to 12 percent slopes	49,936	0	3,342	53,278	2.0
426	Sheppard-Shiprock association, 1 to 12 percent slopes	20,993	0	1,542	22,535	0.8
432	Winona-Rock outcrop complex, 3 to 20 percent slopes	14,550	0	7,545	22,095	0.8
434	Rizozo-Rock outcrop association, 3 to 55 percent slopes	10,160	0	1,257	11,417	0.4
446	Harvey-Oelop association, 0 to 5 percent slopes	9,825	0	14,973	24,798	0.9
476	Saido loam, 1 to 12 percent slopes	12,728	0	1,409	14,137	0.5
485	Rock outcrop-Mion complex, 15 to 65 percent slopes	88,604	0	8,415	97,019	3.6
487	Mion-Badland complex, 20 to 65 percent slopes	7,401	0	7,719	15,120	0.6
500	Timhus-Bandera association, 20 to 50 percent slopes	8,024	0	0	8,024	0.3
505	Flugle-Goesling loamy fine sands, 1 to 8 percent slopes	65,498	245	0	65,743	2.4
514	Raton-Rock outcrop complex, 1 to 10 percent slopes	10,715	0	0	10,715	0.4
515	Rock outcrop-Vessilla-Mion complex, 3 to 55 percent slopes	242,043	8,762	0	250,805	9.3
518	Borrego-Charo-Rock outcrop complex, 1 to 10 percent slopes	7,768	0	0	7,768	0.3
520	Celacy-Atarque complex, 1 to 10 percent slopes	49,290	1,082	0	50,372	1.9
522	Bandera association, 15 to 45 percent slopes	4,287	0	0	4,287	0.2
523	Charo-Raton complex, 1 to 10 percent slopes	33,107	0	0	33,107	1.2
525	Catman-Silkie association, 1 to 10 percent slopes	66,091	6,043	0	72,134	2.7
535	Millpaw loam, 0 to 5 percent slopes	21,581	0	0	21,581	0.8
536	McGaffey loam, 1 to 5 percent slopes	1,883	0	0	1,883	0.1
537	Millpaw-Loarc complex, 0 to 10 percent slopes	11,870	0	0	11,870	0.4
540	Montecito fine sandy loam, 1 to 15 percent slopes	19,278	0	0	19,278	0.7
550	Nogal-Galestina sandy loams, 1 to 10 percent slopes	68,155	1,007	0	69,162	2.6
555	Pinitos-Ribera sandy loams, 1 to 10 percent slopes	55,481	1,618	0	57,099	2.1
560	Flugle-Teco association, 1 to 8 percent slopes	107,826	3,404	0	111,230	4.2
561	Flugle-Quintana complex, 2 to 15 percent slopes	51,253	0	0	51,253	1.9
565	Quintana sandy loam, 5 to 15 percent slopes, gullied	10,783	0	0	10,783	0.4
570	Torreon-Rock outcrop-Cabezon complex, 15 to 45 percent slopes	20,537	0	0	20,537	0.8
575	Teco-Atarque association, 1 to 8 percent slopes	132,254	4,738	0	136,992	5.1
576	Teco sandy loam, 2 to 5 percent slopes	5,141	3,296	0	8,437	0.3
577	Cabezon-Montecito-Rock outcrop association, 1 to 10 percent slopes	135,037	211	0	135,248	5.0
579	Cabezon-Cantina complex, 1 to 7 percent slopes	73,127	298	0	73,425	2.7
581	Laporte-Vessilla complex, 3 to 15 percent slopes	4,476	0	0	4,476	0.2
582	Kenray fine sand, 3 to 15 percent slopes	6,772	0	0	6,772	0.3
585	Moncha silt loam, 2 to 10 percent slopes	4,227	0	0	4,227	0.2
586	Venadito-Teco association, 0 to 10 percent slopes	14,985	0	0	14,985	0.6
591	Valnor-Techado association, 2 to 25 percent slopes	23,544	0	0	23,544	0.9
610	Grieta-Shiprock association, 1 to 10 percent slopes	33,528	0	4,429	37,957	1.4
611	Grieta-Kiki sandy loams, 3 to 15 percent slopes	9,863	0	5,128	14,991	0.6
615	Trag-Techado-Rock outcrop complex, 3 to 55 percent slopes	9,415	0	0	9,415	0.3
618	Netoma sandy loam, 2 to 12 percent slopes	7,266	0	1,968	9,234	0.3
619	Venadito clay loam, 1 to 5 percent slopes	6,796	0	101	6,897	0.3

See footnote at end of table.

TABLE 2.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Cibola	Mckinley	Valencia	Total-- Area	Extent
		Acres	Acres	Acres	Acres	Pct
620	Aparejo-Venadito complex, 1 to 5 percent slopes	17,277	0	2,626	19,903	0.7
625	Hagerman-Bond association, 1 to 10 percent slopes	59,606	0	2,016	61,622	2.3
630	Bond-Rizozo-Rock outcrop complex, 2 to 20 percent slopes	1,528	0	2,323	3,851	0.1
640	Flaco-Berto loams, 0 to 5 percent slopes	13,031	0	5,825	18,856	0.7
641	Berto-Flaco cobbly loams, 1 to 10 percent slopes	23,122	0	1,131	24,253	0.9
645	Penistaja-Oelop association, 0 to 5 percent slopes	9,580	0	2,721	12,301	0.5
650	Winona-Tanbark-Rock outcrop association, 15 to 60 percent slopes	12,436	0	8,860	21,296	0.8
660	Rana-Rock outcrop complex, 2 to 25 percent slopes	30,695	0	0	30,695	1.1
	Water	962	497	0	1,459	0.1
	Total	2,556,800	32,800	106,880	2,696,480	100.0

* Less than 0.1 percent.

TABLE 3.--CAPABILITY SUBCLASSES FOR IRRIGATED LAND AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Only the soils suited to crops and pasture are listed)

Soil name and map symbol	Land capability	Corn	Alfalfa hay	Wheat	Pasture	Irish potatoes
		Bu	Tons	Bu	AUM*	Cwt
20------------------------ Penistaja	IIIe	---	5.0	---	---	---
21------------------------ Clovis	IIIe	---	5.0	---	---	---
40------------------------ Aparejo	IIIe	130	5.0	80	12	250
41------------------------ Aparejo	IIIe	120	5.0	80	13	300
45------------------------ Aparejo	IIIe	135	4.0	80	12	---
50------------------------ Venadito	IIIs	110	4.5	50	12	---
51------------------------ Venadito	IIIs	110	4.5	50	12	---
52------------------------ Venadito Variant	IVe	135	3.0	50	7	---
55------------------------ Glenberg-San Mateo	IIIe	---	5.0	---	---	---
57, 58-------------------- San Mateo	IIIe	---	5.0	---	13	---
60------------------------ Sparank	IIIs	---	5.0	---	12	---
61------------------------ Sparham	IIIs	---	1.5	---	9	---
66------------------------ Zia	IIIe	---	5.0	---	8	---
70------------------------ Catman	IIIs	---	3.0	50	8	---
72------------------------ Catman Variant	IIIs	---	1.5	40	5	---
73------------------------ Catman	IIIs	---	3.0	50	8	---
75------------------------ Hickman	IIIe	---	5.0	50	10	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
120**:									
Rock outcrop.									
Laporte	1R	Severe	Severe	Severe	Slight	Oneseed juniper	36	1	
						Pinyon	---	---	
130**:									
Laporte	1D	Slight	Severe	Severe	Slight	Pinyon	40	1	
						Oneseed juniper	---	---	
Rock outcrop.									
272**:									
Cebolleta	3F	Slight	Moderate	Moderate	Moderate	Ponderosa pine	51	3	Ponderosa pine.
Borrego	3D	Moderate	Moderate	Severe	Moderate	Ponderosa pine	55	3	
Rock outcrop.									
278**:									
Microy	3C	Slight	Slight	Slight	Moderate	Ponderosa pine	51	3	Ponderosa pine.
Rock outcrop.									
282 Cebolleta	3F	Slight	Moderate	Moderate	Moderate	Ponderosa pine	51	3	Ponderosa pine.
284**:									
Cebolleta	3X	Moderate	Moderate	Moderate	Moderate	Ponderosa pine	57	3	Ponderosa pine.
						Douglas fir	---	---	
Rock outcrop.									
286**:									
Cebolleta	3F	Slight	Moderate	Moderate	Moderate	Ponderosa pine	51	3	Ponderosa pine.
Raton	4X	Moderate	Moderate	Severe	Slight	Ponderosa pine	65	4	Ponderosa pine.
						Douglas fir	---	---	
291 Paguate	1C	Moderate	Moderate	Slight	Severe	Oneseed juniper	40	1	Pinyon.
						Pinyon	---	---	
294**:									
Parkay	5F	Moderate	Slight	Slight	Moderate	Engelmann spruce	75	5	Engelmann spruce, Douglas fir.
						Corkbark fir	---	---	
						Douglas fir	77	---	
Rock outcrop.									
310 Mirabal	3D	Slight	Moderate	Moderate	Slight	Ponderosa pine	60	3	Ponderosa pine.
						Douglas fir	62	---	
315**:									
Abersito, cobbly	4X	Slight	Moderate	Moderate	Slight	Ponderosa pine	66	4	Ponderosa pine.

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
315**:									
Abersito	4X	Moderate	Moderate	Moderate	Slight	Ponderosa pine	67	4	Ponderosa pine.
Rock outcrop.									
320 Cinnadale	4D	Slight	Moderate	Moderate	Slight	Ponderosa pine	65	4	Ponderosa pine.
325 Moreno Variant	6A	Slight	Slight	Slight	Severe	Ponderosa pine	87	6	Ponderosa pine.
330 Moreno	5A	Slight	Slight	Slight	Severe	Ponderosa pine	79	5	Ponderosa pine.
350**:									
Rock outcrop.									
Stout	3D	Slight	Slight	Severe	Slight	Ponderosa pine	50	3	
500**:									
Timhus	1R	Severe	Moderate	Slight	Slight	Pinyon	26	1	
						Oneseed juniper	---	---	
Bandera	3R	Slight	Moderate	Slight	Moderate	Ponderosa pine	56	3	Ponderosa pine.
514**:									
Raton	2X	Slight	Moderate	Severe	Slight	Ponderosa pine	42	2	
						Pinyon	---	---	
						Rocky Mountain juniper	---	---	
Rock outcrop.									
515**:									
Rock outcrop.									
Vessilla	1R	Severe	Moderate	Severe	Slight	Pinyon	50	1	
						Oneseed juniper	---	---	
Mion	1R	Severe	Moderate	Severe	Moderate	Pinyon	20	1	
						Oneseed juniper	---	---	
518**:									
Borrego	3D	Moderate	Moderate	Severe	Moderate	Ponderosa pine	55	3	
Charo.									
Rock outcrop.									
520**:									
Celacy	1A	Slight	Moderate	Slight	Moderate	Oneseed juniper	15	1	
						Pinyon	---	---	
						Utah juniper	---	---	
Atarque.									

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
522**:									
Bandera, 30 to 45 percent slopes	3R	Slight	Moderate	Slight	Moderate	Ponderosa pine	56	3	Ponderosa pine.
Bandera, 15 to 30 percent slopes	3F	Slight	Moderate	Slight	Moderate	Ponderosa pine	64	3	Ponderosa pine.
523**:									
Charo	4C	Slight	Slight	Moderate	Moderate	Ponderosa pine	66	4	Ponderosa pine.
						Pinyon	---	---	
						Rocky Mountain juniper	---	---	
Raton	3X	Moderate	Moderate	Severe	Slight	Ponderosa pine	55	3	Ponderosa pine.
						Douglas fir	---	---	
536 McGaffey	6A	Moderate	Slight	Slight	Severe	Ponderosa pine	87	6	Ponderosa pine.
537**:									
Millpaw	1C	Slight	Moderate	Slight	Severe	Pinyon	43	1	Pinyon, oneseed juniper.
						Oneseed juniper	---	---	
Loarc	1A	Slight	Moderate	Slight	Moderate	Pinyon	45	1	Pinyon.
						Oneseed juniper	---	---	
540 Montecito	1C	Slight	Slight	Slight	Severe	Oneseed juniper	34	1	
						Pinyon	---	---	
550**:									
Nogal	1C	Slight	Moderate	Moderate	Moderate	Pinyon	36	1	Pinyon, oneseed juniper.
						Oneseed juniper	---	---	
Galestina.									
555**:									
Pinitos	1A	Slight	Moderate	Slight	Moderate	Pinyon	45	1	Pinyon.
						Oneseed juniper	---	---	
Ribera	1A	Slight	Slight	Slight	Moderate	Pinyon	45	1	Pinyon.
						Oneseed juniper	---	---	
560**:									
Flugle	1A	Slight	Slight	Slight	Severe	Pinyon	40	1	
						Oneseed juniper	---	---	
Teco.									
561**:									
Flugle	1A	Slight	Slight	Slight	Severe	Pinyon	40	1	
						Oneseed juniper	---	---	
Quintana	1A	Moderate	Slight	Slight	Severe	Pinyon	44	1	
						Oneseed juniper	---	---	

See footnotes at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
565------------- Quintana	1A	Moderate	Slight	Slight	Severe	Pinyon--------------	35	1	
						Oneseed juniper-----	---	---	
570**:									
Torreon--------	1F	Slight	Slight	Slight	Severe	Pinyon--------------	45	1	
						Juniper-------------	---	---	
Rock outcrop.									
Cabezon--------	1D	Moderate	Severe	Severe	Slight	Pinyon--------------	47	1	
						Oneseed juniper-----	---	---	
577**:									
Cabezon--------	1D	Slight	Severe	Severe	Slight	Pinyon--------------	45	1	
						Oneseed juniper-----	---	---	
Montecito.									
Rock outcrop.									
579**:									
Cabezon--------	1D	Slight	Severe	Severe	Slight	Pinyon--------------	43	1	
						Oneseed juniper-----	---	---	
Cantina--------	1C	Slight	Slight	Slight	Moderate	Pinyon--------------	55	1	Pinyon.
						Oneseed juniper-----	---	---	
581**:									
Laporte--------	1D	Slight	Severe	Severe	Slight	Pinyon--------------	45	1	
						Oneseed juniper-----	---	---	
Vessilla-------	1D	Moderate	Moderate	Severe	Slight	Pinyon--------------	35	1	
						Oneseed juniper-----	---	---	
582------------- Kenray	3S	Severe	Severe	Slight	Moderate	Ponderosa pine------	60	3	Ponderosa pine.
						Pinyon--------------	---	---	
						Oneseed juniper-----	---	---	
591**:									
Valnor---------	2A	Slight	Slight	Slight	Moderate	Ponderosa pine------	45	2	Ponderosa pine.
Techado--------	2D	Moderate	Moderate	Severe	Moderate	Ponderosa pine------	45	2	Ponderosa pine.
						Rocky Mountain juniper------------	---	---	
615**:									
Trag-----------	3A	Slight	Slight	Slight	Severe	Ponderosa pine------	63	3	Ponderosa pine.
Techado--------	3R	Severe	Moderate	Moderate	Moderate	Ponderosa pine------	56	3	
						Rocky Mountain juniper------------	---	---	
Rock outcrop.									

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil. Only the soils suited to windbreaks and environmental plantings are listed)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
20---------------- Penistaja	---	Pinyon, fourwing saltbush, lilac.	Austrian pine, eastern redcedar, Rocky Mountain juniper, ponderosa pine, white fir.	Russian olive, green ash.	Siberian elm, Lombardy poplar.
21---------------- Clovis	Fourwing saltbush	Skunkbush sumac, Amur honeysuckle, lilac.	Green ash, honeylocust, golden willow.	Russian olive-----	Siberian elm.
30---------------- Warm Springs	---	Lilac, Siberian peashrub, tatarian honeysuckle.	---	Golden willow, Russian olive, plains cottonwood.	Siberian elm.
40---------------- Aparejo	Fourwing saltbush	Pinyon, skunkbush sumac, Amur honeysuckle, lilac.	Eastern redcedar, green ash, honeylocust, golden willow.	Russian olive-----	Siberian elm.
41---------------- Aparejo	Fourwing saltbush	Pinyon, skunkbush sumac, Amur honeysuckle, lilac.	Eastern redcedar, Rocky Mountain juniper, green ash, honeylocust, golden willow.	Russian olive-----	Siberian elm.
45---------------- Aparejo	Fourwing saltbush	Pinyon, skunkbush sumac, Amur honeysuckle, lilac.	Eastern redcedar, green ash, honeylocust, golden willow.	Russian olive-----	Siberian elm.
50, 51------------ Venadito	Fourwing saltbush, lilac.	Green ash, skunkbush sumac, American plum.	Siberian elm, Russian mulberry, Osageorange.	---	---
52---------------- Venadito Variant	Lilac-------------	Austrian pine, eastern redcedar, Rocky Mountain juniper, green ash.	Siberian elm, Russian mulberry, Osageorange.	---	---
55*:					
Glenberg---------	Lilac-------------	Eastern redcedar, Rocky Mountain juniper, pinyon, American plum, Amur honeysuckle.	Green ash, honeylocust, Osageorange.	Russian olive, Siberian elm.	---
San Mateo--------	Lilac-------------	Eastern redcedar, Rocky Mountain juniper, pinyon, American plum, Amur honeysuckle.	Green ash, honeylocust, Osageorange.	Russian olive, Siberian elm.	---

See footnote at end of table.

TABLE 5.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
56. Mespun	Lilac, fourwing saltbush, western sandcherry.	Austrian pine, redcedar, Rocky Mountain juniper, ponderosa pine, Siberian elm, green ash.	---	---	---
57, 58. San Mateo	Lilac.	Pinyon, Amur honeysuckle, American plum, eastern redcedar, Rocky Mountain juniper, fourwing saltbush.	Osageorange, honeylocust, green ash.	Russian olive, Siberian elm.	---
60. Sparank	Lilac.	Austrian pine, eastern redcedar, Rocky Mountain juniper, Russian olive, green ash, skunkbush sumac, American plum.	Siberian elm, Russian mulberry, Osageorange.	---	---
61. Sparham**					
62. Sparank**					
66. Zia	Fourwing saltbush, lilac, western sandcherry.	Austrian pine, eastern redcedar, Rocky Mountain juniper, ponderosa pine, pinyon, Siberian elm, green ash.	Russian olive, honeylocust.	---	---
70. Catman	Lilac.	Austrian pine, eastern redcedar, Rocky Mountain juniper, Russian olive, green ash, skunkbush sumac, American plum, fourwing saltbush.	Siberian elm, Russian mulberry, Osageorange.	---	---
72. Catman Variant**					
73. Catman	Lilac.	Austrian pine, eastern redcedar, Rocky Mountain juniper, Russian olive, green ash, skunkbush sumac, American plum, fourwing saltbush.	Siberian elm, Russian mulberry, Osageorange.	---	---

See footnote at end of table.

TABLE 5.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- <8	8-15	16-25	26-35	>35
75----------------- Hickman	Fourwing saltbush	Skunkbush sumac, lilac.	Eastern redcedar, Rocky Mountain juniper, blue spruce.	Russian olive, green ash, honeylocust, golden willow.	Siberian elm, Lombardy poplar.
100---------------- Manzano	---	Fourwing saltbush, skunkbush sumac, lilac, American plum.	Austrian pine, eastern redcedar, Rocky Mountain juniper, ponderosa pine.	Russian olive, green ash.	Siberian elm, Lombardy poplar.
218*:					
Viuda**					
Penistaja---------	---	Pinyon, fourwing saltbush, lilac.	Austrian pine, eastern redcedar, Rocky Mountain juniper, ponderosa pine, white fir.	Russian olive, green ash.	Siberian elm, Lombardy poplar.
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.
** Planting trees and shrubs may be suitable if special treatment is used.

TABLE 6.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
10*. Lava flows					
20 Penistaja	Slight	Slight	Moderate: slope.	Slight	Slight.
21 Clovis	Slight	Slight	Moderate: slope.	Slight	Slight.
25*:					
Hickman	Severe: flooding.	Slight	Moderate: slope, small stones, flooding.	Slight	Moderate: flooding.
Catman	Severe: flooding.	Moderate: excess salt.	Moderate: slope, flooding, percs slowly.	Slight	Moderate: excess salt, flooding.
30 Warm Springs	Severe: flooding.	Moderate: flooding, wetness, excess salt.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
40, 41 Aparejo	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
45 Aparejo	Severe: flooding.	Moderate: too clayey.	Moderate: too clayey, flooding.	Moderate: too clayey.	Severe: too clayey.
50, 51 Venadito	Severe: flooding.	Moderate: percs slowly.	Moderate: flooding, percs slowly.	Slight	Moderate: flooding.
52 Venadito Variant	Severe: flooding.	Moderate: percs slowly.	Moderate: flooding, percs slowly.	Slight	Moderate: flooding, depth to rock.
55*:					
Glenberg	Severe: flooding.	Slight	Moderate: small stones, flooding.	Slight	Moderate: droughty, flooding.
San Mateo	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
56 Mespun	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.	Moderate: droughty.
57, 58 San Mateo	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight	Moderate: flooding.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
60-------------------- Sparank	Severe: flooding.	Moderate: percs slowly.	Moderate: slope, flooding, percs slowly.	Slight----------	Moderate: flooding.
61-------------------- Sparham	Severe: flooding.	Moderate: excess salt, percs slowly.	Moderate: flooding, percs slowly, excess salt.	Slight----------	Moderate: excess salt, flooding.
62-------------------- Sparank	Severe: flooding, excess sodium, excess salt.	Severe: excess sodium, excess salt.	Severe: excess sodium, excess salt.	Slight----------	Severe: excess salt, excess sodium, droughty.
66-------------------- Zia	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
70-------------------- Catman	Severe: flooding.	Moderate: excess salt.	Moderate: slope, flooding, percs slowly.	Slight----------	Moderate: excess salt, flooding.
72-------------------- Catman Variant	Severe: flooding.	Moderate: wetness, excess salt, percs slowly.	Moderate: slope, wetness, flooding.	Slight----------	Moderate: excess salt, droughty, flooding.
73-------------------- Catman	Severe: flooding.	Moderate: excess salt.	Moderate: slope, flooding, percs slowly.	Slight----------	Moderate: excess salt, flooding.
75-------------------- Hickman	Severe: flooding.	Slight----------	Moderate: slope, small stones, flooding.	Slight----------	Moderate: flooding.
100------------------- Manzano	Severe: flooding.	Slight----------	Moderate: slope, flooding.	Slight----------	Moderate: flooding.
120*: Rock outcrop.					
Laporte--------------	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, depth to rock.
130*: Laporte--------------	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight----------	Severe: depth to rock.
Rock outcrop.					
200------------------- Penistaja	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
205 Ildefonso	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones, droughty.
210*:					
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
Penistaja	Slight	Slight	Severe: slope.	Slight	Slight.
Rock outcrop.					
218*:					
Viuda	Severe: large stones, small stones, depth to rock.	Severe: large stones, small stones, depth to rock.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: small stones, large stones, depth to rock.
Penistaja	Slight	Slight	Moderate: slope.	Slight	Slight.
Rock outcrop.					
230*:					
Dumps.					
Pits.					
251*:					
Skyvillage	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
Rock outcrop.					
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Severe: depth to rock.
257*:					
Sparank	Severe: flooding.	Moderate: percs slowly.	Moderate: flooding, percs slowly.	Slight	Moderate: flooding.
San Mateo	Severe: flooding.	Moderate: dusty.	Moderate: slope, flooding, dusty.	Moderate: dusty.	Moderate: flooding.
259 Mikim	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, dusty.	Moderate: dusty.	Slight.
262*:					
Poley	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.	Severe: small stones, large stones, slope.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
262*:					
Pojoaque	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope, dusty.	Severe: small stones, large stones, slope.
264 Tapia	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.
270 Charo	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones, depth to rock.
272*:					
Cebolleta	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.	Severe: large stones.
Borrego	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
Rock outcrop.					
276 Trag	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: large stones.
278*:					
Microy	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: slope.
Rock outcrop.					
282 Cebolleta	Moderate: large stones.	Moderate: large stones.	Severe: large stones, slope.	Moderate: large stones.	Severe: large stones.
284*:					
Cebolleta	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope.
Rock outcrop.					
286*:					
Cebolleta	Severe: large stones.	Severe: large stones.	Severe: large stones, small stones.	Moderate: large stones.	Severe: large stones.
Raton	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Slight	Severe: depth to rock.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
290*:					
Paguate	Moderate: dusty.	Moderate: dusty.	Moderate: slope, small stones, depth to rock.	Moderate: dusty.	Moderate: large stones, depth to rock.
Hackroy	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Moderate: large stones.	Severe: large stones, depth to rock.
291 Paguate	Moderate: large stones, small stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Moderate: large stones.	Moderate: small stones, large stones, depth to rock.
294*:					
Parkay	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Rock outcrop.					
300 Saladon	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
310 Mirabal	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
315*:					
Abersito, cobbly	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, slope.
Abersito	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones.
Rock outcrop.					
320 Cinnadale	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight	Severe: depth to rock.
325 Moreno Variant	Slight	Slight	Severe: slope.	Slight	Slight.
330 Moreno	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.
340 Yankee	Slight	Slight	Slight	Slight	Slight.
350*:					
Rock outcrop.					

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
350*:					
Stout	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
406*:					
Poley	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Moderate: large stones, dusty.	Severe: large stones.
Rock outcrop.					
407*:					
Viuda	Severe: large stones, small stones, depth to rock.	Severe: large stones, small stones, depth to rock.	Severe: large stones, small stones.	Moderate: large stones.	Severe: small stones, large stones, depth to rock.
Rock outcrop.					
419 Navajo	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight	Severe: excess sodium.
420*:					
Navajo	Severe: flooding, excess sodium.	Severe: excess sodium.	Severe: excess sodium.	Slight	Severe: excess sodium.
Suwanee	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight	Moderate: flooding.
424*:					
Mespun	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty.
Palma	Slight	Slight	Moderate: slope.	Slight	Slight.
426*:					
Sheppard	Slight	Slight	Severe: slope.	Slight	Moderate: droughty.
Shiprock	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
432*:					
Winona	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Moderate: dusty.	Severe: small stones.
Rock outcrop.					
434*:					
Rizozo	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
434*: Rock outcrop.					
446*: Harvey	Slight	Slight	Moderate: slope.	Slight	Slight.
Oelop	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
476 Saido	Moderate: excess salt.	Moderate: excess salt.	Severe: slope.	Slight	Moderate: excess salt.
485*: Rock outcrop.					
Mion	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: large stones, slope, depth to rock.
487*: Mion	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, depth to rock.
Badland.					
500*: Timhus	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
Bandera	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, droughty, slope.
505*: Flugle	Slight	Slight	Moderate: slope.	Slight	Slight.
Goesling	Slight	Slight	Moderate: slope.	Slight	Slight.
514*: Raton	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones.	Severe: large stones, depth to rock.
Rock outcrop.					
515*: Rock outcrop.					
Vessilla	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
515*:					
Mion	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, depth to rock.
518*:					
Borrego	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
Charo	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones, depth to rock.
Rock outcrop.					
520*:					
Celacy	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
Atarque	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
522*:					
Bandera, 30 to 45 percent slopes	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: droughty, slope.
Bandera, 15 to 30 percent slopes	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: droughty, slope.
523*:					
Charo	Moderate: large stones.	Moderate: large stones.	Moderate: slope, small stones.	Slight	Moderate: large stones, depth to rock.
Raton	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope.	Severe: large stones.	Severe: large stones, depth to rock.
525*:					
Catman	Severe: flooding.	Moderate: excess salt.	Moderate: slope, flooding, percs slowly.	Slight	Moderate: excess salt, flooding.
Silkie	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
535 Millpaw	Slight	Slight	Moderate: slope.	Slight	Slight.
536 McGaffey	Slight	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
537*:					
Millpaw	Slight	Slight	Moderate: slope.	Slight	Slight.
Loarc	Slight	Slight	Moderate: slope.	Slight	Slight.
540 Montecito	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: large stones, slope.
550*:					
Nogal	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
Galestina	Slight	Slight	Moderate: slope.	Slight	Slight.
555*:					
Pinitos	Slight	Slight	Moderate: slope.	Slight	Slight.
Ribera	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
560*:					
Flugle	Slight	Slight	Moderate: slope.	Slight	Slight.
Teco	Slight	Slight	Moderate: slope.	Slight	Slight.
561*:					
Flugle	Slight	Slight	Moderate: slope.	Slight	Slight.
Quintana	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
565 Quintana	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
570*:					
Torreon	Severe: slope, large stones, small stones.	Severe: slope, large stones, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, large stones, slope.
Rock outcrop.					
Cabezon	Severe: slope, large stones, depth to rock.	Severe: slope, large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, slope, depth to rock.
575*:					
Teco	Slight	Slight	Moderate: slope.	Slight	Slight.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
575*:					
Atarque	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Severe: depth to rock.
576 Teco	Slight	Slight	Moderate: slope.	Slight	Slight.
577*:					
Cabezon	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, depth to rock.
Montecito	Slight	Slight	Moderate: slope.	Slight	Moderate: large stones.
Rock outcrop.					
579*:					
Cabezon	Severe: large stones, depth to rock.	Severe: large stones, depth to rock.	Severe: large stones, small stones.	Severe: large stones.	Severe: large stones, depth to rock.
Cantina	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight	Slight.
581*:					
Laporte	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight	Severe: depth to rock.
Vessilla	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
582 Kenray	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.	Moderate: droughty, slope.
585 Moncha	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
586*:					
Venadito	Severe: flooding.	Moderate: percs slowly.	Moderate: slope, flooding, percs slowly.	Slight	Moderate: flooding.
Teco	Slight	Slight	Severe: slope.	Slight	Slight.
591*:					
Valnor	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight	Moderate: depth to rock.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
591*:					
Techado	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
610*:					
Grieta	Slight	Slight	Moderate: slope.	Slight	Slight.
Shiprock	Slight	Slight	Severe: slope.	Slight	Moderate: droughty.
611*:					
Grieta	Slight	Slight	Severe: slope.	Slight	Slight.
Kiki	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
615*:					
Trag	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
Techado	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.					
618 Netoma	Moderate: dusty, excess salt.	Moderate: excess salt, dusty.	Severe: slope.	Moderate: dusty.	Moderate: excess salt.
619 Venadito	Severe: flooding.	Moderate: percs slowly.	Moderate: slope, flooding, percs slowly.	Slight	Moderate: flooding.
620*:					
Aparejo	Severe: flooding.	Slight	Moderate: slope, flooding.	Slight	Moderate: flooding.
Venadito	Severe: flooding.	Moderate: percs slowly.	Moderate: slope, flooding, percs slowly.	Slight	Moderate: flooding.
625*:					
Hagerman	Slight	Slight	Moderate: slope, depth to rock.	Slight	Moderate: depth to rock.
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.

See footnote at end of table.

TABLE 6.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
630*:					
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
Rizozo	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: erodes easily.	Severe: depth to rock.
Rock outcrop.					
640*:					
Flaco	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: depth to rock.
Berto	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Severe: depth to rock.
641*:					
Berto	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, depth to rock.	Moderate: dusty.	Severe: depth to rock.
Flaco	Moderate: large stones, small stones.	Moderate: large stones, small stones.	Severe: large stones, small stones.	Moderate: dusty.	Moderate: small stones, large stones.
645*:					
Penistaja	Slight	Slight	Moderate: slope.	Slight	Slight.
Oelop	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Moderate: dusty.	Slight.
650*:					
Winona	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Tanbark	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, erodes easily.	Severe: slope, depth to rock.
Rock outcrop.					
660*:					
Rana	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, too clayey.
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
10*. Lava flows											
20----------------- Penistaja	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
21----------------- Clovis	Fair	Good	Good	---	Poor	Good	Fair	Fair	---	Fair	Fair.
25*:											
Hickman-----------	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Catman------------	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
30----------------- Warm Springs	Very poor.	Very poor.	Poor	---	Poor	Fair	Fair	Poor	---	Fair	Poor.
40----------------- Aparejo	Good	Good	Fair	---	Fair	Good	Fair	Good	---	Fair	Fair.
41----------------- Aparejo	Fair	Good	Good	---	Good	Poor	Very poor.	Good	---	Very poor.	Good.
45----------------- Aparejo	Good	Good	Fair	---	Fair	Good	Fair	Good	---	Fair	Fair.
50, 51------------- Venadito	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
52----------------- Venadito Variant	Fair	Fair	Fair	---	Poor	Poor	Fair	Fair	Good	Poor	Poor.
55*:											
Glenberg----------	Poor	Poor	Fair	---	Fair	Poor	Poor	Poor	---	Poor	Fair.
San Mateo---------	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
56----------------- Mespun	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
57, 58------------- San Mateo	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
60----------------- Sparank	Fair	Fair	Fair	---	Fair	Good	Good	Fair	---	Good	Fair.
61----------------- Sparham	Fair	Fair	Poor	---	Poor	Fair	Fair	Fair	---	Fair	Poor.
62----------------- Sparank	Very poor.	Very poor.	Very poor.	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
66----------------- Zia	Good	Good	Good	Fair	Fair	Fair	Poor	Good	Good	Poor	Fair.
70----------------- Catman	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
72----------------- Catman Variant	Fair	Fair	Poor	---	Poor	Fair	Poor	Fair	---	Poor	Poor.
73----------------- Catman	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
75----------------- Hickman	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
100---------------- Manzano	Fair	Good	Fair	---	Fair	Fair	Fair	Fair	---	Fair	---
120*: Rock outcrop.											
Laporte-----------	Poor	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
130*: Laporte-----------	Poor	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
Rock outcrop.											
200---------------- Penistaja	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
205---------------- Ildefonso	Poor	Poor	Poor	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Very poor.
210*: Bond--------------	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Penistaja---------	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Rock outcrop.											
218*: Viuda-------------	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Penistaja---------	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Rock outcrop.											
230*: Dumps.											
Pits.											

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
251*:											
Skyvillage	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop.											
Bond	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
257*:											
Sparank	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
San Mateo	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
259 Mikim	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
262*:											
Poley	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Pojoaque	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
264 Tapia	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
270 Charo	Poor	Poor	Fair	Good	Fair	Poor	Very poor.	Poor	Good	Very poor.	Fair.
272*:											
Cebolleta	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Borrego	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Rock outcrop.											
276 Trag	Fair	Good	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
278*:											
Microy	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Rock outcrop.											
282 Cebolleta	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
284*:											
Cebolleta	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Rock outcrop.											

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
286*:											
Cebolleta	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Raton	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair.
290*:											
Paguate	Poor	Fair	Good	---	Good	Poor	Poor	Fair	---	Poor	Good.
Hackroy	Very poor.	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor.
291 Paguate	Poor	Fair	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor	Fair.
294*:											
Parkay	Poor	Poor	Good	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
Rock outcrop.											
300 Saladon	Poor	Poor	Good	---	Poor	Good	Good	Poor	---	Good	Fair.
310 Mirabal	Poor	Fair	Poor	Very poor.	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
315*:											
Abersito, cobbly	Poor	Poor	Good	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Abersito	Poor	Poor	Good	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Rock outcrop.											
320 Cinnadale	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.	Fair.
325 Moreno Variant	Fair	Good	Good	Good	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
330 Moreno	Poor	Fair	Good	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
340 Yankee	Fair	Good	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
350*:											
Rock outcrop.											
Stout	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
406*:											
Poley	Poor	Fair	Fair	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Rock outcrop.											

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
407*:											
Viuda	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
419 Navajo	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
420*:											
Navajo	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
Suwanee	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
424*:											
Mespun	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Palma	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
426*:											
Sheppard	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Shiprock	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
432*:											
Winona	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop.											
434*:											
Rizozo	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop.											
446*:											
Harvey	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Fair.
Oelop	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
476 Saido	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
485*:											
Rock outcrop.											
Mion	Very poor.	Poor	Poor	---	Poor	Very poor.	Very poor.	Poor	---	Very poor.	Poor.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
487*:											
Mion	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Badland.											
500*:											
Timhus	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Good	Very poor.	Fair.
Bandera	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
505*:											
Flugle	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Goesling	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
514*:											
Raton.											
Rock outcrop.											
515*:											
Rock outcrop.											
Vessilla	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
Mion	Very poor.	Very poor.	Fair	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
518*:											
Borrego	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Charo	Poor	Poor	Fair	Good	Fair	Poor	Very poor.	Poor	Good	Very poor.	Fair.
Rock outcrop.											
520*:											
Celacy	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Atarque	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Poor	Poor	Very poor.	Fair.
522*:											
Bandera, 30 to 45 percent slopes	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Bandera, 15 to 30 percent slopes	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
523*:											
Charo	Poor	Poor	Fair	Good	Fair	Poor	Very poor.	Poor	Good	Very poor.	Fair.
Raton	Very poor.	Very poor.	Fair	Very poor.	Fair	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair.
525*:											
Catman	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Silkie	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
535 Millpaw	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
536 McGaffey	Poor	Fair	Good	Good	Fair	Poor	Poor	Fair	Fair	Poor	Fair.
537*:											
Millpaw	Poor	Fair	Fair	Good	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Loarc	Poor	Fair	Fair	Good	Fair	Poor	Very poor.	Fair	Good	Very poor.	Fair.
540 Montecito	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.	Fair.
550*:											
Nogal	Poor	Fair	Fair	Good	Poor	Very poor.	Very poor.	Fair	Good	Very poor.	---
Galestina	Poor	Fair	Good	---	Good	Poor	Very poor.	Fair	---	Very poor.	Good.
555*:											
Pinitos	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Good.
Ribera	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Good.
560*:											
Flugle	Poor	Fair	Fair	Good	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Teco	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
561*:											
Flugle	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Quintana	Poor	Fair	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
565----------------- Quintana	Poor	Fair	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
570*:											
Torreon-----------	Poor	Fair	Fair	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Rock outcrop.											
Cabezon-----------	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
575*:											
Teco---------------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Atarque-----------	Poor	Poor	Fair	Poor	Fair	Poor	Very poor.	Poor	Poor	Very poor.	Fair.
576----------------- Teco	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
577*:											
Cabezon-----------	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Montecito---------	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
579*:											
Cabezon-----------	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Poor	Very poor.	Fair.
Cantina-----------	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Good.
581*:											
Laporte-----------	Poor	Fair	Poor	Very poor.	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
Vessilla----------	Very poor.	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor.
582----------------- Kenray	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
585----------------- Moncha	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
586*:											
Venadito----------	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Teco---------------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
591*:											
Valnor	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Techado	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
610*:											
Grieta	Very poor.	Very poor.	Good	---	Good	Poor	Very poor.	Poor	---	Very poor.	Good.
Shiprock	Very poor.	Very poor.	Poor	---	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Poor.
611*:											
Grieta	Very poor.	Very poor.	Good	---	Good	Poor	Very poor.	Poor	---	Very poor.	Good.
Kiki	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
615*:											
Trag	Poor	Fair	Good	Good	Fair	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
Techado	Poor	Fair	Fair	Poor	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Rock outcrop.											
618 Netoma	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
619 Venadito	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
620*:											
Aparejo	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Venadito	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
625*:											
Hagerman	Poor	Fair	Fair	---	Poor	Poor	Very poor.	Poor	---	Very poor.	Fair.
Bond	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
630*:											
Bond	Poor	Poor	Fair	---	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Rizozo	Very poor.	Very poor.	Poor	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Fair.
Rock outcrop.											

See footnote at end of table.

TABLE 7.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
640*:											
Flaco	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Berto	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
641*:											
Berto	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Flaco	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
645*:											
Penistaja	Poor	Fair	Fair	---	Fair	Poor	Very poor.	Fair	---	Very poor.	Fair.
Oelop	Poor	Poor	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
650*:											
Winona	Very poor.	Very poor.	Poor	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Tanbark	Very poor.	Very poor.	Fair	---	Fair	Poor	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.											
660*:											
Rana	Very poor.	Very poor.	Very poor.	---	Fair	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
Rock outcrop.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
10*. Lava flows						
20----------------- Penistaja	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: low strength.	Slight.
21----------------- Clovis	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: low strength.	Slight.
25*:						
Hickman----------	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Catman-----------	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: excess salt, flooding.
30----------------- Warm Springs	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding, frost action.	Severe: flooding.
40----------------- Aparejo	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
41----------------- Aparejo	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
45----------------- Aparejo	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: too clayey.
50, 51------------ Venadito	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: flooding.
52----------------- Venadito Variant	Severe: depth to rock.	Severe: flooding, shrink-swell.	Severe: flooding, depth to rock, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: flooding, depth to rock.
55*:						
Glenberg---------	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
San Mateo--------	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
56----------------- Mespun	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
57, 58------------ San Mateo	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
60---------------- Sparank	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: flooding.
61---------------- Sparham	Moderate: too clayey, wetness, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: excess salt, flooding.
62---------------- Sparank	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: excess salt, excess sodium, droughty.
66---------------- Zia	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
70---------------- Catman	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: excess salt, flooding.
72---------------- Catman Variant	Severe: wetness.	Severe: flooding, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: excess salt, droughty, flooding.
73---------------- Catman	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: excess salt, flooding.
75---------------- Hickman	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
100--------------- Manzano	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
120*: Rock outcrop.						
Laporte----------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: large stones, slope, depth to rock.
130*: Laporte----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.						
200--------------- Penistaja	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
205--------------- Ildefonso	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones, droughty.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
210*:						
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Penistaja	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Rock outcrop.						
218*:						
Viuda	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: small stones, large stones, depth to rock.
Penistaja	Slight	Slight	Slight	Slight	Moderate: low strength.	Slight.
Rock outcrop.						
230*: Dumps.						
Pits.						
251*:						
Skyvillage	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
257*:						
Sparank	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: flooding.
San Mateo	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
259 Mikim	Slight	Slight	Slight	Slight	Slight	Slight.
262*:						
Poley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
Pojoaque	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, large stones, slope.
264 Tapia	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: large stones.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
270---------------- Charo	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: low strength.	Moderate: large stones, depth to rock.
272*:						
Cebolleta--------	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: slope, large stones.	Severe: low strength, large stones.	Severe: large stones.
Borrego----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.						
276---------------- Trag	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Moderate: large stones.
278*:						
Microy-----------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Rock outcrop.						
282---------------- Cebolleta	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: large stones.	Severe: low strength, large stones.	Severe: large stones.
284*:						
Cebolleta--------	Severe: depth to rock, large stones, slope.	Severe: slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope, large stones.	Severe: low strength, slope, large stones.	Severe: large stones, slope.
Rock outcrop.						
286*:						
Cebolleta--------	Severe: depth to rock, large stones.	Severe: large stones.	Severe: depth to rock, large stones.	Severe: large stones.	Severe: low strength, large stones.	Severe: large stones.
Raton------------	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: depth to rock.
290*:						
Paguate----------	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: low strength.	Moderate: large stones, depth to rock.
Hackroy----------	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, depth to rock.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
291 Paguate	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, low strength.	Moderate: small stones, large stones, depth to rock.
294*:						
Parkay	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
300 Saladon	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
310 Mirabal	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Severe: small stones.
315*:						
Abersito, cobbly	Severe: depth to rock, large stones, slope.	Severe: shrink-swell, slope, large stones.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, large stones.	Severe: shrink-swell, low strength, slope.	Severe: large stones, slope.
Abersito	Severe: depth to rock, large stones.	Severe: shrink-swell, large stones.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, large stones.	Severe: shrink-swell, low strength.	Moderate: small stones, large stones.
Rock outcrop.						
320 Cinnadale	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
325 Moreno Variant	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
330 Moreno	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: large stones.
340 Yankee	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
350*:						
Rock outcrop.						
Stout	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
406*:						
Poley	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: large stones.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
406*:						
Rock outcrop.						
407*:						
Viuda	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: small stones, large stones, depth to rock.
Rock outcrop.						
419 Navajo	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: excess sodium.
420*:						
Navajo	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Severe: excess sodium.
Suwanee	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
424*:						
Mespun	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Palma	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
426*:						
Sheppard	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Shiprock	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
432*:						
Winona	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: small stones.
Rock outcrop.						
434*:						
Rizozo	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
446*:						
Harvey	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.	Slight.
Oelop	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
476----------- Saido	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: excess salt.
485*: Rock outcrop.						
Mion-------------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: large stones, slope, depth to rock.
487*: Mion-------------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock.
Badland.						
500*: Timhus-----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Bandera----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, droughty, slope.
505*: Flugle-----------	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
Goesling---------	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Moderate: shrink-swell.	Slight.
514*: Raton------------	Severe: depth to rock, large stones.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, depth to rock.
Rock outcrop.						
515*: Rock outcrop.						
Vessilla---------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
Mion-------------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock.
518*: Borrego----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
518*:						
Charo------------	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: low strength.	Moderate: large stones, depth to rock.
Rock outcrop.						
520*:						
Celacy-----------	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Moderate: depth to rock, shrink-swell.	Moderate: depth to rock.
Atarque----------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
522*:						
Bandera, 30 to 45 percent slopes--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Bandera, 15 to 30 percent slopes--	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
523*:						
Charo------------	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: low strength.	Moderate: large stones, depth to rock.
Raton------------	Severe: depth to rock, large stones.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, depth to rock.
525*:						
Catman-----------	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: excess salt, flooding.
Silkie-----------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
535--------------- Millpaw	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
536--------------- McGaffey	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: low strength, frost action.	Slight.
537*:						
Millpaw----------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Loarc------------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
540----------------- Montecito	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: large stones, slope.
550*:						
Nogal-------------	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: depth to rock.
Galestina---------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
555*:						
Pinitos-----------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Moderate: frost action.	Slight.
Ribera------------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, low strength.	Moderate: depth to rock.
560*:						
Flugle------------	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
Teco--------------	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
561*:						
Flugle------------	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Moderate: shrink-swell, frost action.	Slight.
Quintana----------	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
565----------------- Quintana	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
570*:						
Torreon-----------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: small stones, large stones, slope.
Rock outcrop.						
Cabezon-----------	Severe: depth to rock, slope.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, slope, depth to rock.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
575*:						
Teco	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
Atarque	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
576 Teco	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
577*:						
Cabezon	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, depth to rock.
Montecito	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: large stones.
Rock outcrop.						
579*:						
Cabezon	Severe: depth to rock.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: depth to rock, shrink-swell, low strength.	Severe: large stones, depth to rock.
Cantina	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Moderate: depth to rock, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
581*:						
Laporte	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Vessilla	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Severe: depth to rock.
582 Kenray	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
585 Moncha	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: low strength, frost action.	Slight.
586*:						
Venadito	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: flooding.
Teco	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
591*:						
Valnor	Moderate: depth to rock, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Moderate: depth to rock.
Techado	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope, depth to rock.
610*:						
Grieta	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Shiprock	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
611*:						
Grieta	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
Kiki	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, shrink-swell, slope.	Moderate: slope, depth to rock.
615*:						
Trag	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Techado	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope, depth to rock.
Rock outcrop.						
618 Netoma	Slight	Slight	Slight	Moderate: slope.	Slight	Moderate: excess salt.
619 Venadito	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: flooding.
620*:						
Aparejo	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Venadito	Moderate: too clayey, flooding.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: flooding, shrink-swell.	Severe: shrink-swell, low strength, flooding.	Moderate: flooding.
625*:						
Hagerman	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Severe: depth to rock.	Moderate: shrink-swell, depth to rock.	Moderate: depth to rock, shrink-swell.	Moderate: depth to rock.
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
630*:						
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rizozo	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Rock outcrop.						
640*:						
Flaco	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: depth to rock.
Berto	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
641*:						
Berto	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Flaco	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, low strength.	Moderate: small stones, large stones.
645*:						
Penistaja	Slight	Slight	Slight	Slight	Moderate: low strength.	Slight.
Oelop	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
650*:						
Winona	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: small stones, slope.
Tanbark	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
660*:						
Rana	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Severe: large stones, too clayey.
Rock outcrop.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
10*. Lava flows					
20 Penistaja	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
21 Clovis	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
25*: Hickman	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Catman	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
30 Warm Springs	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: small stones, wetness.
40 Aparejo	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
41 Aparejo	Severe: flooding, percs slowly.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: thin layer.
45 Aparejo	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
50, 51 Venadito	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
52 Venadito Variant	Severe: flooding, depth to rock, percs slowly.	Severe: depth to rock, flooding.	Severe: flooding, depth to rock, too clayey.	Severe: flooding, depth to rock.	Poor: depth to rock, too clayey, hard to pack.
55*: Glenberg	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding.	Severe: flooding.	Fair: too sandy.
San Mateo	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
56 Mespun	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy.
57, 58 San Mateo	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
60: Sparank	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
61: Sparham	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack.
62: Sparank	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, excess salt.	Severe: flooding.	Poor: hard to pack.
66: Zia	Slight	Severe: seepage.	Slight	Slight	Good.
70: Catman	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
72: Catman Variant	Severe: flooding, wetness, percs slowly.	Severe: flooding.	Severe: flooding, wetness, too clayey.	Severe: flooding, wetness.	Poor: too clayey, hard to pack.
73: Catman	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
75: Hickman	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
100: Manzano	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, seepage.	Severe: flooding.	Fair: too clayey.
120*: Rock outcrop.					
Laporte	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
130*: Laporte	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Rock outcrop.					
200: Penistaja	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
205: Ildefonso	Moderate: slope.	Severe: seepage, slope.	Moderate: slope, large stones.	Moderate: slope.	Poor: small stones.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
210*:					
Bond	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Penistaja	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Rock outcrop.					
218*:					
Viuda	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock, hard to pack.
Penistaja	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Rock outcrop.					
230*:					
Dumps.					
Pits.					
251*:					
Skyvillage	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Rock outcrop.					
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
257*:					
Sparank	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: hard to pack.
San Mateo	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
259 Mikim	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
262*:					
Poley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Pojoaque	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
264 Tapia	Slight	Severe: seepage.	Severe: too sandy.	Slight	Poor: too sandy, small stones.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
270------------------ Charo	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
272*:					
Cebolleta----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Borrego------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Rock outcrop.					
276------------------ Trag	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey, small stones.
278*:					
Microy-------------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Rock outcrop.					
282------------------ Cebolleta	Severe: depth to rock, percs slowly.	Severe: depth to rock, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
284*:					
Cebolleta----------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Rock outcrop.					
286*:					
Cebolleta----------	Severe: depth to rock, percs slowly.	Severe: depth to rock, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Raton--------------	Severe: depth to rock.	Severe: depth to rock, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
290*:					
Paguate------------	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight-----------	Poor: depth to rock, small stones.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
290*:					
Hackroy	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
291 Paguate	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock, small stones.
294*:					
Parkay	Severe: slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.
Rock outcrop.					
300 Saladon	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
310 Mirabal	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
315*:					
Abersito, cobbly	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, large stones.
Abersito	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, large stones.
Rock outcrop.					
320 Cinnadale	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock, small stones.
325 Moreno Variant	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
330 Moreno	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
340 Yankee	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
350*:					
Rock outcrop.					

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
350*:					
Stout	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock.
406*:					
Poley	Severe: percs slowly.	Severe: seepage, slope.	Moderate: slope.	Moderate: slope.	Poor: hard to pack.
Rock outcrop.					
407*:					
Viuda	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock, hard to pack.
Rock outcrop.					
419 Navajo	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
420*:					
Navajo	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
Suwanee	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too sandy.
424*:					
Mespun	Severe: poor filter.	Severe: seepage, slope.	Severe: too sandy.	Slight	Poor: too sandy.
Palma	Slight	Severe: seepage.	Slight	Slight	Good.
426*:					
Sheppard	Severe: poor filter.	Severe: seepage, slope.	Moderate: too sandy.	Slight	Fair: too sandy.
Shiprock	Slight	Severe: seepage.	Slight	Slight	Good.
432*:					
Winona	Severe: depth to rock.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Moderate: slope.	Poor: depth to rock.
Rock outcrop.					
434*:					
Rizozo	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
434*:					
Rock outcrop.					
446*:					
Harvey	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Oelop	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Good.
476 Saido	Severe: excess gypsum.	Severe: excess gypsum.	Slight	Slight	Poor: thin layer.
485*:					
Rock outcrop.					
Mion	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
487*:					
Mion	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
Badland.					
500*:					
Timhus	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
Bandera	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
505*:					
Flugle	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Goesling	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
514*:					
Raton	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Rock outcrop.					
515*:					
Rock outcrop.					

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
515*:					
Vessilla	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Mion	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, hard to pack, slope.
518*:					
Borrego	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
Charo	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Rock outcrop.					
520*:					
Celacy	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
Atarque	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
522*:					
Bandera, 30 to 45 percent slopes	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
Bandera, 15 to 30 percent slopes	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: seepage, small stones, slope.
523*:					
Charo	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Raton	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
525*:					
Catman	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
Silkie	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
535----------------- Millpaw	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
536----------------- McGaffey	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
537*:					
Millpaw-------------	Severe: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
Loarc---------------	Slight-----------	Severe: seepage.	Moderate: too sandy.	Slight-----------	Fair: too sandy, small stones.
540----------------- Montecito	Severe: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
550*:					
Nogal---------------	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Galestina-----------	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
555*:					
Pinitos-------------	Slight-----------	Severe: seepage.	Slight-----------	Slight-----------	Good.
Ribera--------------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
560*:					
Flugle--------------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
Teco----------------	Severe: percs slowly.	Severe: seepage.	Slight-----------	Slight-----------	Good.
561*:					
Flugle--------------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Good.
Quintana------------	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, slope.
565----------------- Quintana	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
570*:					
Torreon	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
Cabezon	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
575*:					
Teco	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Atarque	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
576 Teco	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Good.
577*:					
Cabezon	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Montecito	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Rock outcrop.					
579*:					
Cabezon	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Cantina	Severe: percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Poor: thin layer.
581*:					
Laporte	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
Vessilla	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock.	Poor: depth to rock.
582 Kenray	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
585 Moncha	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
586*:					
Venadito	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
Teco	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Good.
591*:					
Valnor	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Techado	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
610*:					
Grieta	Slight	Severe: seepage.	Slight	Slight	Good.
Shiprock	Slight	Severe: seepage.	Slight	Slight	Good.
611*:					
Grieta	Slight	Severe: seepage.	Slight	Slight	Good.
Kiki	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
615*:					
Trag	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Techado	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
Rock outcrop.					
618 Netoma	Severe: excess gypsum.	Severe: excess gypsum, slope.	Slight	Slight	Good.
619 Venadito	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.
620*:					
Aparejo	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Fair: too clayey.
Venadito	Severe: flooding, percs slowly.	Severe: flooding.	Severe: flooding, too clayey.	Severe: flooding.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
625*:					
Hagerman	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
Bond	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
630*:					
Bond	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Rizozo	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Moderate: slope.	Poor: depth to rock.
Rock outcrop.					
640*:					
Flaco	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
Berto	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
641*:					
Berto	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
Flaco	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Poor: depth to rock.
645*:					
Penistaja	Moderate: percs slowly.	Severe: seepage.	Slight	Slight	Good.
Oelop	Severe: percs slowly.	Severe: seepage.	Slight	Slight	Good.
650*:					
Winona	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: slope.	Poor: depth to rock, slope.
Tanbark	Severe: depth to rock, slope, excess gypsum.	Severe: depth to rock, slope, excess gypsum.	Severe: depth to rock, slope.	Severe: slope.	Poor: depth to rock, slope.
Rock outcrop.					
660*:					
Rana	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: hard to pack.
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
10*. Lava flows				
20. Penistaja	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
21. Clovis	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
25*:				
Hickman	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Catman	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
30. Warm Springs	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, excess salt.
40. Aparejo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
41. Aparejo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
45. Aparejo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
50, 51. Venadito	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
52. Venadito Variant	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
55*:				
Glenberg	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
San Mateo	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
56. Mespun	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
57, 58: San Mateo	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
60: Sparank	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
61: Sparham	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
62: Sparank	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt, excess sodium.
66: Zia	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
70: Catman	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
72: Catman Variant	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess salt.
73: Catman	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
75: Hickman	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
100: Manzano	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
120*: Rock outcrop.				
Laporte	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
130*: Laporte	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Rock outcrop.				
200: Penistaja	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
205: Ildefonso	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
210*:				
Bond	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Penistaja	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Rock outcrop.				
218*:				
Viuda	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, large stones.
Penistaja	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Rock outcrop.				
230*:				
Dumps.				
Pits.				
251*:				
Skyvillage	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop.				
Bond	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
257*:				
Sparank	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
San Mateo	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
259 Mikim	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
262*:				
Poley	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Pojoaque	Fair: large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
264------------------- Tapia	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
270------------------- Charo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
272*:				
Cebolleta------------	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones.
Borrego--------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
Rock outcrop.				
276------------------- Trag	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
278*:				
Microy---------------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, slope.
Rock outcrop.				
282------------------- Cebolleta	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones.
284*:				
Cebolleta------------	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones, slope.
Rock outcrop.				
286*:				
Cebolleta------------	Poor: depth to rock, low strength, large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones.
Raton----------------	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones.
290*:				
Paguate--------------	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
290*:				
Hackroy	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
291 Paguate	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
294*:				
Parkay	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
Rock outcrop.				
300 Saladon	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
310 Mirabal	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
315*:				
Abersito, cobbly	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones, slope.
Abersito	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: too clayey, large stones.
Rock outcrop.				
320 Cinnadale	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
325 Moreno Variant	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
330 Moreno	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones, area reclaim.
340 Yankee	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
350*:				
Rock outcrop.				
Stout	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
406*:				
Poley	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, area reclaim.
Rock outcrop.				
407*:				
Viuda	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, large stones.
Rock outcrop.				
419 Navajo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
420*:				
Navajo	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, excess sodium.
Suwanee	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
424*:				
Mespun	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Palma	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
426*:				
Sheppard	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
Shiprock	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
432*:				
Winona	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones.
Rock outcrop.				
434*:				
Rizozo	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop.				
446*:				
Harvey	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, area reclaim.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
446*:				
Oelop	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
476 Saido	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
485*:				
Rock outcrop.				
Mion	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
487*:				
Mion	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.
Badland.				
500*:				
Timhus	Poor: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
Bandera	Poor: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
505*:				
Flugle	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Goesling	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
514*:				
Raton	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, too clayey, large stones.
Rock outcrop.				
515*:				
Rock outcrop.				
Vessilla	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Mion	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, slope.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
518*:				
Borrego	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey.
Charo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rock outcrop.				
520*:				
Celacy	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
Atarque	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
522*:				
Bandera, 30 to 45 percent slopes	Poor: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
Bandera, 15 to 30 percent slopes	Fair: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
523*:				
Charo	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones.
Raton	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: depth to rock, large stones.
525*:				
Catman	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Silkie	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
535 Millpaw	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
536 McGaffey	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
537*:				
Millpaw	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Loarc	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
540 Montecito	Good	Improbable: small stones.	Probable	Poor: too clayey, small stones, area reclaim.
550*:				
Nogal	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Galestina	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
555*:				
Pinitos	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Ribera	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, thin layer.
560*:				
Flugle	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Teco	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
561*:				
Flugle	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
Quintana	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
565 Quintana	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
570*:				
Torreon	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
570*:				
Cabezon	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, large stones.
575*:				
Teco	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Atarque	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
576 Teco	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
577*:				
Cabezon	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, large stones.
Montecito	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, thin layer.
Rock outcrop.				
579*:				
Cabezon	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, large stones.
Cantina	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
581*:				
Laporte	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Vessilla	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock.
582 Kenray	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
585 Moncha	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Good.
586*:				
Venadito	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Teco	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
591*:				
Valnor	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Techado	Poor: depth to rock, low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
610*:				
Grieta	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Shiprock	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
611*:				
Grieta	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Kiki	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.
615*:				
Trag	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, area reclaim, slope.
Techado	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, too clayey, small stones.
Rock outcrop.				
618 Netoma	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
619 Venadito	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
620*:				
Aparejo	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Venadito	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
625*:				
Hagerman	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Fair: depth to rock, too clayey, small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
625*:				
Bond	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
630*:				
Bond	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Rizozo	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Rock outcrop.				
640*:				
Flaco	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Berto	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
641*:				
Berto	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Flaco	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
645*:				
Penistaja	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Oelop	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
650*:				
Winona	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, large stones, slope.
Tanbark	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, slope.
Rock outcrop.				
660*:				
Rana	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Rock outcrop.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
10*. Lava flows					
20 Penistaja	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
21 Clovis	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Erodes easily.
25*:					
Hickman	Moderate: slope.	Moderate: piping.	Deep to water	Slope, flooding.	Erodes easily.
Catman	Slight	Severe: hard to pack.	Deep to water	Percs slowly	Percs slowly.
30 Warm Springs	Moderate: seepage.	Severe: piping.	Flooding, frost action.	Wetness, droughty, erodes easily.	Erodes easily, wetness.
40 Aparejo	Moderate: seepage.	Severe: piping.	Deep to water	Flooding	Erodes easily.
41 Aparejo	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Flooding	Favorable.
45 Aparejo	Moderate: seepage.	Severe: piping.	Deep to water	Slow intake, flooding.	Erodes easily.
50, 51 Venadito	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Percs slowly.
52 Venadito Variant	Moderate: depth to rock.	Moderate: thin layer, hard to pack.	Deep to water	Percs slowly, depth to rock, flooding.	Depth to rock, percs slowly.
55*:					
Glenberg	Severe: seepage.	Severe: piping.	Deep to water	Droughty, soil blowing, flooding.	Too sandy, soil blowing.
San Mateo	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding	Favorable.
56 Mespun	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.
57, 58 San Mateo	Moderate: seepage.	Moderate: piping.	Deep to water	Flooding	Favorable.
60 Sparank	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Erodes easily, percs slowly.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
61 Sparham	Slight	Moderate: hard to pack, wetness, excess salt.	Deep to water	Percs slowly, flooding, excess salt.	Percs slowly.
62 Sparank	Slight	Severe: excess sodium, excess salt.	Deep to water	Droughty	Erodes easily, percs slowly.
66 Zia	Severe: seepage.	Slight	Deep to water	Slope, soil blowing.	Favorable.
70 Catman	Slight	Severe: hard to pack.	Deep to water	Percs slowly	Percs slowly.
72 Catman Variant	Slight	Severe: hard to pack.	Percs slowly, flooding, frost action.	Wetness, droughty, percs slowly.	Wetness, percs slowly.
73 Catman	Slight	Severe: hard to pack.	Deep to water	Percs slowly	Percs slowly.
75 Hickman	Slight	Moderate: piping.	Deep to water	Flooding	Favorable.
100 Manzano	Moderate: slope.	Moderate: thin layer, piping.	Deep to water	Slope, flooding.	Erodes easily.
120*: Rock outcrop.					
Laporte	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.
130*: Laporte	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, large stones, depth to rock.
Rock outcrop.					
200 Penistaja	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable.
205 Ildefonso	Severe: seepage, slope.	Moderate: large stones.	Deep to water	Slope, droughty.	Slope, large stones.
210*: Bond	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, soil blowing.
Penistaja	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable.
Rock outcrop.					

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
218*:					
Viuda	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Large stones, depth to rock.
Penistaja	Severe: seepage.	Severe: piping.	Deep to water	Slope	Favorable.
Rock outcrop.					
230*:					
Dumps.					
Pits.					
251*:					
Skyvillage	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock.
Rock outcrop.					
Bond	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Depth to rock, soil blowing.
257*:					
Sparank	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Erodes easily, percs slowly.
San Mateo	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily, flooding.	Erodes easily.
259 Mikim	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable.
262*:					
Poley	Severe: slope.	Severe: piping.	Deep to water	Slope, percs slowly.	Slope, erodes easily.
Pojoaque	Severe: slope.	Moderate: large stones.	Deep to water	Slope, large stones.	Slope, large stones.
264 Tapia	Severe: seepage.	Severe: seepage.	Deep to water	Slope, soil blowing.	Large stones, too sandy, soil blowing.
270 Charo	Moderate: depth to rock.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock.	Depth to rock, percs slowly.
272*:					
Cebolleta	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.
Borrego	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock.
Rock outcrop.					

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
276--------------- Trag	Moderate: seepage, slope.	Severe: piping.	Deep to water----	Slope------------	Favorable.
278*:					
Microy-----------	Severe: slope.	Moderate: thin layer, hard to pack, large stones.	Deep to water----	Slope, large stones, droughty.	Slope, large stones, depth to rock.
Rock outcrop.					
282--------------- Cebolleta	Moderate: depth to rock, slope.	Severe: large stones.	Deep to water----	Slope, large stones, droughty.	Large stones, depth to rock.
284*:					
Cebolleta--------	Severe: slope.	Severe: large stones.	Deep to water----	Slope, large stones, droughty.	Slope, large stones, depth to rock.
Rock outcrop.					
286*:					
Cebolleta--------	Moderate: depth to rock, slope.	Severe: large stones.	Deep to water----	Slope, large stones, droughty.	Large stones, depth to rock.
Raton------------	Severe: depth to rock.	Severe: large stones.	Deep to water----	Slope, large stones, droughty.	Large stones, depth to rock.
290*:					
Paguate----------	Moderate: depth to rock, slope.	Moderate: thin layer, piping, large stones.	Deep to water----	Slope, percs slowly, depth to rock.	Large stones, depth to rock, erodes easily.
Hackroy----------	Severe: depth to rock.	Severe: thin layer.	Deep to water----	Slope, percs slowly.	Depth to rock, percs slowly.
291--------------- Paguate	Moderate: depth to rock, slope.	Moderate: thin layer, piping, large stones.	Deep to water----	Slope, percs slowly, depth to rock.	Large stones, depth to rock.
294*:					
Parkay-----------	Severe: slope.	Severe: large stones.	Deep to water----	Slope, large stones, droughty.	Slope, large stones.
Rock outcrop.					
300--------------- Saladon	Slight-----------	Severe: wetness.	Percs slowly-----	Wetness----------	Wetness, percs slowly.
310--------------- Mirabal	Severe: slope.	Severe: thin layer.	Deep to water----	Slope, large stones, droughty.	Slope, large stones, depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
315*:					
Abersito, cobbly	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.
Abersito	Moderate: depth to rock, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Large stones, depth to rock.
Rock outcrop.					
320 Cinnadale	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, droughty, depth to rock.	Slope, large stones, depth to rock.
325 Moreno Variant	Moderate: seepage, slope.	Slight	Deep to water	Slope, erodes easily.	Erodes easily.
330 Moreno	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.
340 Yankee	Slight	Moderate: hard to pack.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.
350*:					
Rock outcrop.					
Stout	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.
406*:					
Poley	Severe: seepage, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, percs slowly.	Slope, percs slowly.
Rock outcrop.					
407*:					
Viuda	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Large stones, depth to rock.
Rock outcrop.					
419 Navajo	Moderate: slope.	Severe: excess sodium.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.
420*:					
Navajo	Moderate: slope.	Severe: excess sodium.	Deep to water	Slope, percs slowly.	Percs slowly.
Suwanee	Moderate: slope.	Moderate: piping.	Deep to water	Slope, erodes easily, flooding.	Erodes easily.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
424*:					
Mespun	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.
Palma	Severe: seepage.	Severe: piping.	Deep to water	Slope, fast intake, soil blowing.	Soil blowing.
426*:					
Sheppard	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.
Shiprock	Severe: seepage.	Slight	Deep to water	Slope, droughty.	Soil blowing.
432*:					
Winona	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.
Rock outcrop.					
434*:					
Rizozo	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.
Rock outcrop.					
446*:					
Harvey	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Erodes easily.
Oelop	Severe: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily.
476 Saido	Severe: excess gypsum, seepage.	Severe: excess gypsum, thin layer.	Deep to water	Excess gypsum, slope, erodes easily.	Excess gypsum, erodes easily.
485*:					
Rock outcrop.					
Mion	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.
487*:					
Mion	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.
Badland.					
500*:					
Timhus	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
500*:					
Bandera	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope.
505*:					
Flugle	Moderate: seepage, slope.	Slight	Deep to water	Slope, fast intake.	Erodes easily, soil blowing.
Goesling	Moderate: slope.	Slight	Deep to water	Slope, fast intake, soil blowing.	Soil blowing.
514*:					
Raton	Severe: depth to rock.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Large stones, depth to rock.
Rock outcrop.					
515*:					
Rock outcrop.					
Vessilla	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.
Mion	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.
518*:					
Borrego	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.
Charo	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, percs slowly.
Rock outcrop.					
520*:					
Celacy	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Depth to rock, erodes easily.
Atarque	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, soil blowing, depth to rock.	Depth to rock, soil blowing.
522*:					
Bandera, 30 to 45 percent slopes	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions
522*:					
Bandera, 15 to 30 percent slopes	Severe: seepage, slope.	Severe: seepage.	Deep to water	Slope, droughty.	Slope.
523*:					
Charo	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Large stones, depth to rock, percs slowly.
Raton	Severe: depth to rock.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Large stones, depth to rock.
525*:					
Catman	Moderate: slope.	Severe: hard to pack.	Deep to water	Slope, percs slowly.	Percs slowly.
Silkie	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Percs slowly.
535 Millpaw	Moderate: seepage.	Moderate: hard to pack.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.
536 McGaffey	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily.
537*:					
Millpaw	Moderate: seepage.	Moderate: hard to pack.	Deep to water	Percs slowly, erodes easily.	Erodes easily, percs slowly.
Loarc	Severe: seepage.	Slight	Deep to water	Slope, soil blowing.	Too sandy, soil blowing.
540 Montecito	Severe: seepage, slope.	Moderate: thin layer, large stones.	Deep to water	Slope, soil blowing.	Slope, large stones.
550*:					
Nogal	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, soil blowing, percs slowly.	Depth to rock, soil blowing.
Galestina	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, soil blowing, percs slowly.	Erodes easily, soil blowing, percs slowly.
555*:					
Pinitos	Severe: seepage.	Slight	Deep to water	Slope, soil blowing.	Favorable.
Ribera	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, soil blowing, depth to rock.	Depth to rock.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
560*:					
Flugle	Moderate: seepage, slope.	Slight	Deep to water	Slope, fast intake.	Erodes easily, soil blowing.
Teco	Severe: seepage.	Slight	Deep to water	Soil blowing	Erodes easily, soil blowing.
561*:					
Flugle	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily, soil blowing.
Quintana	Severe: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.
565 Quintana	Severe: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.
570*:					
Torreon	Severe: slope.	Moderate: piping.	Deep to water	Slope, percs slowly.	Slope, erodes easily.
Rock outcrop.					
Cabezon	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, large stones, percs slowly.	Slope, large stones, depth to rock.
575*:					
Teco	Severe: seepage.	Slight	Deep to water	Soil blowing	Erodes easily, soil blowing.
Atarque	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, soil blowing, depth to rock.	Depth to rock, soil blowing.
576 Teco	Severe: seepage.	Slight	Deep to water	Slope, soil blowing.	Erodes easily, soil blowing.
577*:					
Cabezon	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, large stones, percs slowly.	Large stones, depth to rock.
Montecito	Moderate: slope.	Slight	Deep to water	Slope	Favorable.
Rock outcrop.					
579*:					
Cabezon	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, large stones, percs slowly.	Large stones, depth to rock.
Cantina	Moderate: seepage, depth to rock.	Moderate: thin layer, piping.	Deep to water	Soil blowing, percs slowly.	Soil blowing.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
581*:					
Laporte	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, large stones, depth to rock.
Vessilla	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.
582 Kenray	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Slope, too sandy, soil blowing.
585 Moncha	Moderate: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily.
586*:					
Venadito	Slight	Moderate: hard to pack.	Deep to water	Percs slowly	Percs slowly.
Teco	Severe: seepage.	Slight	Deep to water	Slope	Erodes easily.
591*:					
Valnor	Moderate: depth to rock, slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope, percs slowly.	Depth to rock, erodes easily.
Techado	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Percs slowly, depth to rock, slope.	Slope, depth to rock, percs slowly.
610*:					
Grieta	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing.
Shiprock	Severe: seepage.	Slight	Deep to water	Slope, droughty.	Soil blowing.
611*:					
Grieta	Severe: seepage.	Severe: piping.	Deep to water	Slope, soil blowing.	Soil blowing.
Kiki	Severe: slope.	Severe: piping.	Deep to water	Slope, soil blowing, depth to rock.	Slope, depth to rock, soil blowing.
615*:					
Trag	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope, large stones.
Techado	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, percs slowly.
Rock outcrop.					
618 Netoma	Severe: excess gypsum, seepage.	Severe: excess gypsum, piping.	Deep to water	Excess gypsum, slope, erodes easily.	Excess gypsum, erodes easily.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
619----------- Venadito	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Percs slowly.
620*:					
Aparejo----------	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, flooding.	Erodes easily.
Venadito---------	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly, erodes easily.	Erodes easily, percs slowly.
625*:					
Hagerman---------	Moderate: seepage, depth to rock, slope.	Moderate: thin layer, piping.	Deep to water	Slope, soil blowing, depth to rock.	Depth to rock.
Bond-------------	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Depth to rock, soil blowing.
630*:					
Bond-------------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock, soil blowing.
Rizozo-----------	Severe: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.
Rock outcrop.					
640*:					
Flaco------------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Depth to rock	Depth to rock, erodes easily.
Berto------------	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, depth to rock, erodes easily.	Depth to rock, erodes easily.
641*:					
Berto------------	Severe: depth to rock.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Depth to rock, erodes easily.
Flaco------------	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Large stones, depth to rock.
645*:					
Penistaja--------	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Oelop------------	Severe: seepage.	Moderate: piping.	Deep to water	Favorable	Erodes easily.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions
650*:					
Winona	Severe: depth to rock, slope.	Severe: large stones.	Deep to water	Slope, large stones, droughty.	Slope, large stones, depth to rock.
Tanbark	Severe: depth to rock, slope, seepage.	Severe: thin layer, excess gypsum.	Deep to water	Depth to rock, slope, excess gypsum.	Slope, depth to rock, erodes easily.
Rock outcrop.					
660*:					
Rana	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, slow intake, percs slowly.	Slope, percs slowly.
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
10*. Lava flows											
20---------------- Penistaja	0-6	Fine sandy loam	SC-SM, CL-ML	A-4	0	100	100	90-100	40-60	20-30	5-10
	6-60	Sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	95-100	45-75	30-35	10-15
21---------------- Clovis	0-8	Sandy clay loam	CL-ML	A-4	0	100	100	90-100	65-85	25-30	5-10
	8-60	Sandy clay loam, clay loam, loam.	CL	A-6	0	100	100	90-100	50-85	30-40	10-20
25*:											
Hickman----------	0-4	Loam-------------	CL-ML, CL	A-4, A-6	0	80-100	75-100	60-75	50-65	25-35	5-15
	4-60	Stratified sandy loam to silty clay loam.	CL	A-6	0	80-100	75-100	60-75	50-65	25-40	10-20
Catman-----------	0-12	Silty clay loam	CL	A-6, A-7	0	100	100	90-100	80-90	35-45	15-20
	12-60	Clay-------------	CH	A-7	0	100	100	90-100	80-90	60-70	30-40
30---------------- Warm Springs	0-8	Loam-------------	ML	A-4	0	100	100	60-80	50-65	15-25	NP-5
	8-36	Gravelly sandy loam, loam.	SC-SM, CL-ML	A-4	0	80-100	70-100	60-80	45-60	25-30	5-10
	36-60	Sandy loam, loam	SC-SM, CL-ML	A-4	0	90-100	85-100	60-80	45-60	25-30	5-10
40---------------- Aparejo	0-6	Clay loam--------	CL	A-6, A-7	0	100	100	90-100	80-90	35-45	15-20
	6-47	Silty clay loam, silt loam, clay loam.	CL	A-6	0	100	100	90-100	80-90	25-40	10-20
	47-60	Silt loam, sandy clay loam, clay loam.	CL	A-6	0	100	100	85-100	65-85	25-35	10-15
41---------------- Aparejo	0-6	Clay loam--------	CL	A-6	0	100	100	80-95	75-85	35-40	15-20
	6-42	Clay loam, sandy clay loam.	CL	A-6	0	100	100	70-85	65-75	30-40	15-20
	42-60	Stratified fine sand to clay loam.	SM, SC-SM, SC	A-2, A-4, A-6	0	100	100	60-80	30-50	15-40	NP-15
45---------------- Aparejo	0-15	Clay-------------	CL, CH	A-7	0	100	100	85-100	80-95	45-55	20-30
	15-38	Sandy clay loam, clay loam.	CL	A-6	0	100	100	90-100	80-90	25-40	10-20
	38-60	Sandy clay loam, fine sandy loam.	CL	A-6	0	100	100	85-100	65-85	25-35	10-15
50---------------- Venadito	0-14	Clay loam--------	CL	A-6, A-7	0	100	100	85-95	75-85	35-45	15-20
	14-60	Clay-------------	CH	A-7	0	100	100	95-100	85-95	55-65	30-40
51---------------- Venadito	0-19	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	60-75	45-60	30-40	10-15
	19-60	Clay-------------	CH	A-7	0	100	100	95-100	85-95	55-65	30-40

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
52--------------- Venadito Variant	0-3	Clay loam--------	CL	A-6	0	100	100	85-95	75-85	30-35	10-15
	3-35	Clay-------------	CH	A-7	0	100	100	95-100	85-95	50-60	30-40
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
55*:											
Glenberg--------	0-11	Sandy loam-------	SM	A-4	0	95-100	85-100	60-70	35-45	15-20	NP-5
	11-21	Sandy loam-------	SM	A-4	0	95-100	85-100	60-70	35-45	15-20	NP-5
	21-60	Stratified loamy sand to loam.	SM	A-2, A-4	0	90-100	75-90	50-80	25-40	15-20	NP-5
San Mateo-------	0-4	Sandy clay loam	SC, CL	A-6	0	100	100	55-75	35-55	30-35	10-15
	4-60	Stratified sandy loam to silty clay loam.	CL	A-6	0	85-100	75-90	60-75	50-65	30-40	10-20
56--------------- Mespun	0-2	Loamy sand-------	SM	A-2	0	100	100	60-80	20-35	---	NP
	2-60	Fine sand, loamy fine sand, loamy sand.	SM	A-2	0	100	100	70-90	15-35	---	NP
57--------------- San Mateo	0-6	Clay loam--------	CL	A-6	0	100	100	80-90	60-70	35-40	15-20
	6-60	Stratified sandy loam to silty clay loam.	CL	A-6	0	85-100	75-90	60-75	50-65	30-40	10-20
58--------------- San Mateo	0-4	Sandy clay loam	SC, CL	A-6	0	100	100	55-75	35-55	30-35	10-15
	4-47	Loam, sandy clay loam.	SC, CL	A-6	0	85-100	75-90	60-75	45-65	30-40	10-20
	47-60	Stratified sandy loam to silty clay loam.	CL	A-6	0	85-100	75-90	60-75	50-65	30-40	10-20
60--------------- Sparank	0-10	Clay loam--------	CL	A-6, A-7	0	95-100	90-100	80-95	70-90	35-45	15-20
	10-60	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	95-100	90-100	80-95	70-90	40-55	15-30
61--------------- Sparham	0-10	Clay loam--------	CL	A-6, A-7	0	100	100	80-100	75-90	35-45	15-20
	10-60	Silty clay, clay	CL, CH	A-7	0	100	100	90-100	80-95	45-60	20-30
62--------------- Sparank	0-5	Sandy clay loam	SC	A-2, A-6	0	95-100	90-100	50-70	30-40	30-40	15-20
	5-60	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	95-100	90-100	80-95	70-90	40-55	20-30
66--------------- Zia	0-8	Fine sandy loam	SC-SM	A-2, A-4	0	80-100	75-100	55-70	25-40	20-30	5-10
	8-60	Sandy loam, fine sandy loam.	SC-SM	A-2, A-4	0	80-100	75-100	60-75	25-45	20-30	5-10
70--------------- Catman	0-6	Clay loam--------	CL	A-6, A-7	0	100	100	65-95	50-80	30-45	10-20
	6-60	Clay-------------	CH	A-7	0	100	100	90-100	80-90	60-70	30-40
72--------------- Catman Variant	0-10	Clay loam--------	CL	A-6, A-7	0	100	100	80-95	65-80	35-45	15-20
	10-60	Clay-------------	CH	A-7	0	100	100	90-100	80-90	60-70	30-40
73--------------- Catman	0-10	Sandy clay loam	CL	A-6, A-7	0	100	100	65-95	50-80	30-45	10-20
	10-60	Clay-------------	CH	A-7	0	100	100	90-100	80-90	60-70	30-40
75--------------- Hickman	0-6	Sandy clay loam	CL	A-6	0	80-100	75-100	70-85	50-80	30-40	15-20
	6-60	Stratified sandy loam to silty clay loam.	CL	A-6	0	80-100	75-100	60-75	50-65	25-40	10-20

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
100-------------- Manzano	0-4	Loam-------------	CL-ML	A-4	0	90-100	90-100	85-100	60-80	20-30	5-10
	4-60	Loam, clay loam, silt loam.	CL	A-6	0	80-100	75-100	70-100	50-85	25-40	10-20
120*: Rock outcrop.											
Laporte---------	0-2	Very cobbly loam	SC-SM, GM-GC, GC, SC	A-4, A-6	30-45	60-75	55-70	40-60	35-50	25-35	5-15
	2-11	Gravelly loam, cobbly loam.	CL-ML, SC-SM, CL, SC	A-4, A-6	10-25	70-90	65-85	50-70	45-60	25-35	5-15
	11-15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
130*: Laporte---------	0-3	Gravelly loam----	CL-ML, ML, GM, GM-GC	A-4	0-15	60-90	60-75	45-60	40-55	20-30	NP-10
	3-11	Gravelly loam, cobbly loam.	CL-ML, SC-SM, CL, SC	A-4, A-6	10-25	70-90	65-85	50-70	45-60	25-35	5-15
	11-15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
200-------------- Penistaja	0-2	Fine sandy loam	SC-SM, CL-ML	A-4	0	100	100	90-100	40-60	20-30	5-10
	2-22	Sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	95-100	45-75	30-35	10-15
	22-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	100	100	70-95	30-55	20-30	5-15
205-------------- Ildefonso	0-3	Very gravelly sandy loam.	GM-GC	A-2	0-25	40-55	35-50	25-35	10-20	15-25	5-10
	3-60	Very gravelly loam, very gravelly sandy loam.	GM-GC	A-2, A-4	10-25	40-60	35-55	25-50	10-40	15-25	5-10
210*: Bond------------	0-7	Sandy loam-------	SM	A-2, A-4	0-15	100	95-100	60-75	30-50	15-25	NP-5
	7-16	Sandy clay loam, clay loam, loam.	SC, CL	A-2, A-6	0-15	80-100	70-100	60-75	30-60	20-35	10-20
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Penistaja-------	0-3	Sandy loam-------	SC-SM, CL-ML	A-4	0	100	100	90-100	40-60	20-30	5-10
	3-30	Sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	95-100	45-75	30-35	10-15
	30-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	100	100	70-95	30-55	20-30	5-15
Rock outcrop.											

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
218*:											
Viuda-----------	0-3	Very cobbly sandy loam.	GM-GC, SC-SM	A-2	30-50	50-75	45-70	40-55	15-30	20-30	5-10
	3-16	Clay, sandy clay	CL, CH	A-7	0-10	95-100	90-100	55-75	50-65	40-55	20-30
	16-19	Cobbly clay loam, sandy clay loam, clay loam.	CL	A-6	10-25	95-100	90-100	60-75	50-60	30-40	10-20
	19-23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Penistaja--------	0-2	Sandy loam--------	SC-SM, CL-ML	A-4	0	100	100	90-100	40-60	20-30	5-10
	2-24	Sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	95-100	45-75	30-35	10-15
	24-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	100	100	70-95	30-55	20-30	5-15
Rock outcrop.											
230*:											
Dumps.											
Pits.											
251*:											
Skyvillage------	0-4	Sandy loam--------	SC-SM	A-4	0-10	95-100	85-100	60-80	35-50	20-25	5-10
	4-12	Fine sandy loam, sandy loam, loam.	SC-SM, CL-ML	A-4	0-10	95-100	85-100	60-85	35-65	20-30	5-10
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
Bond------------	0-4	Sandy loam--------	SM	A-2, A-4	0-15	100	95-100	60-75	30-50	15-25	NP-5
	4-10	Sandy clay loam, clay loam, loam.	SC, CL	A-2, A-6	0-15	80-100	80-100	60-75	30-60	20-35	10-20
	10-14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
257*:											
Sparank---------	0-2	Clay loam---------	CL	A-6, A-7	0	95-100	90-100	80-95	70-90	35-45	15-20
	2-60	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	95-100	90-100	80-95	70-90	40-55	15-30
San Mateo-------	0-2	Loam--------------	CL-ML, CL	A-4, A-6	0	100	100	80-95	60-75	20-30	5-15
	2-29	Loam, sandy clay loam.	SC, CL	A-6	0	85-100	75-90	60-75	45-65	30-40	10-20
	29-60	Stratified sandy loam to silty clay loam.	CL	A-6	0	85-100	75-90	60-75	50-65	30-40	10-20
259-------------- Mikim	0-4	Loam--------------	ML, CL-ML	A-4	0-5	85-100	75-100	65-95	50-75	20-30	NP-10
	4-60	Sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	65-95	50-75	25-40	5-15

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
262*:											
Poley-----------	0-2	Very cobbly loam	GM-GC	A-2, A-4	25-40	50-70	40-65	30-60	25-50	20-25	5-10
	2-18	Clay, clay loam, gravelly clay loam.	SC, CL, GC	A-6, A-7	0-15	70-100	60-100	50-90	40-80	30-45	15-30
	18-60	Loam-------------	CL-ML	A-4	0-10	90-100	85-100	70-80	60-70	20-25	5-10
Pojoaque--------	0-3	Very cobbly loam	GM-GC, SC-SM	A-2, A-4	30-50	50-75	45-70	40-55	25-40	20-30	5-10
	3-60	Gravelly clay loam, gravelly sandy clay loam, cobbly clay loam.	SC-SM	A-2, A-4	10-25	70-90	65-85	55-65	30-50	25-30	5-10
264-------------- Tapia	0-4	Sandy loam-------	SC-SM	A-2, A-4	0-10	90-100	90-100	60-80	30-45	20-25	5-10
	4-23	Clay loam, sandy clay loam.	CL	A-6	0-10	90-100	85-100	75-90	55-75	30-40	10-20
	23-40	Cobbly sandy loam, very cobbly sandy clay loam, very cobbly sandy loam.	SC-SM, GM-GC	A-2	15-40	55-85	50-80	45-60	20-35	25-30	5-10
	40-60	Cobbly sand------	SM	A-1, A-2	15-25	70-95	65-90	40-55	10-20	---	NP
270-------------- Charo	0-5	Loam-------------	CL	A-6	0-15	95-100	90-100	75-90	65-80	30-35	10-15
	5-28	Clay loam, clay	CL, CH	A-7	0-15	95-100	90-100	85-95	75-85	40-60	20-30
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
272*:											
Cebolleta-------	0-2	Cobbly loam------	CL-ML	A-4	30-40	85-95	80-90	70-85	60-75	20-25	5-10
	2-8	Very cobbly loam, very cobbly clay loam.	CL	A-6	45-55	75-90	70-85	60-75	50-65	25-35	10-20
	8-25	Very cobbly clay	SC, GC, CL, CH	A-7	40-55	55-85	50-80	45-70	40-60	45-60	20-30
	25-29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Borrego---------	0-4	Gravelly loam----	SC, GC	A-6	5-15	65-80	60-75	55-65	40-50	25-35	10-15
	4-18	Gravelly clay, clay, gravelly clay loam.	CL	A-7	0	70-100	70-90	65-85	55-80	40-50	20-25
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
276-------------- Trag	0-3	Loam-------------	ML, CL-ML	A-4	0-15	85-100	75-100	55-80	50-65	20-30	NP-10
	3-24	Clay loam, loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-15	85-100	80-100	75-95	55-75	25-35	5-15
	24-60	Sandy clay loam, clay loam, loam.	SC	A-2, A-6	0-15	80-95	75-90	60-80	30-50	25-30	10-15

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
278*:											
Microy----------	0-3	Cobbly loam------	CL-ML, CL	A-4, A-6	15-30	75-95	70-90	55-75	50-65	20-30	5-15
	3-28	Cobbly clay, gravelly clay loam.	CL, CH	A-7	15-30	75-95	70-90	60-80	55-75	40-55	20-30
	28-36	Very cobbly clay, cobbly clay.	CL, CH	A-7	25-30	65-95	60-90	55-75	50-65	45-55	20-30
	36-40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
282-------------- Cebolleta	0-4	Cobbly loam------	CL-ML	A-4	30-40	85-95	80-90	70-85	60-75	20-25	5-10
	4-10	Very cobbly loam, very cobbly clay loam.	CL	A-6	45-55	75-90	70-85	60-75	50-65	25-35	10-20
	10-25	Very cobbly clay	SC, GC, CL, CH	A-7	40-55	55-85	50-80	45-70	40-60	45-60	20-30
	25-29	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
284*:											
Cebolleta-------	0-5	Very cobbly loam	GM-GC, SC-SM, CL-ML	A-4	40-45	55-85	50-80	45-65	40-55	20-25	5-10
	5-10	Very cobbly loam, very cobbly clay loam.	CL	A-6	45-55	75-90	70-85	60-75	50-65	25-35	10-20
	10-24	Very cobbly clay	SC, GC, CL, CH	A-6, A-7	40-55	55-85	50-80	45-70	40-60	35-55	20-40
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
286*:											
Cebolleta-------	0-3	Very cobbly loam	GM-GC, SC-SM, CL-ML	A-4	40-45	55-85	50-80	45-65	40-55	20-25	5-10
	3-9	Very cobbly loam, very cobbly clay loam.	CL	A-6	45-55	75-90	70-85	60-75	50-65	25-35	10-20
	9-28	Very cobbly clay	SC, GC, CL, CH	A-6, A-7	40-55	55-85	50-80	45-70	40-60	35-55	20-40
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Raton-----------	0-3	Cobbly loam------	CL	A-6	15-25	85-95	80-90	75-90	60-80	30-35	10-15
	3-10	Very stony clay, very cobbly clay loam.	CH, CL	A-7	50-80	85-95	80-90	75-90	65-85	40-60	20-30
	10-14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
290*:											
Paguate	0-3	Loam	CL	A-6	0-10	90-100	85-100	75-90	65-80	25-35	10-15
	3-8	Clay loam	CL	A-6, A-7	0-10	90-100	85-100	80-95	70-85	35-45	15-20
	8-19	Clay, gravelly clay, cobbly clay.	CL, CH	A-7	0-15	85-100	80-100	75-95	70-85	45-55	20-30
	19-33	Cobbly loam, clay loam, gravelly clay loam.	CL	A-6	0-25	80-90	70-85	65-80	60-75	30-40	10-20
	33-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Hackroy	0-3	Cobbly loam	CL-ML, CL	A-4, A-6	30-40	85-95	80-90	70-85	60-75	20-30	5-15
	3-14	Clay loam, clay	CL, CH	A-7	0	95-100	95-100	80-90	70-85	40-55	20-30
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
291 Paguate	0-5	Cobbly clay loam	CL	A-6	15-30	75-95	70-90	65-85	55-75	30-40	15-20
	5-26	Clay, gravelly clay, cobbly clay.	CL	A-7	0-25	75-100	70-100	65-95	60-85	40-50	20-30
	26-38	Gravelly loam, cobbly loam, clay loam.	CL	A-6	0-25	80-90	70-85	65-80	60-75	30-40	10-20
	38-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
294*:											
Parkay	0-2	Stony loam	CL	A-6	15-30	75-95	70-90	55-75	50-65	25-35	10-15
	2-23	Very cobbly sandy clay loam, very gravelly sandy clay loam, very cobbly clay loam.	GC, SC	A-2	25-45	50-70	45-65	40-60	20-35	30-40	10-20
	23-60	Very cobbly sandy clay loam, extremely cobbly sandy clay loam.	GC, SC	A-2, A-6	40-60	45-75	40-70	30-50	30-45	30-40	10-20
Rock outcrop.											
300 Saladon	0-4	Clay loam	CL	A-6, A-7	0	100	100	90-100	80-90	35-45	15-20
	4-60	Clay, sandy clay, clay loam.	CL, CH	A-7	0	80-100	75-100	70-90	50-80	45-55	20-30
310 Mirabal	0-3	Very gravelly loam.	GM-GC	A-2	10-25	40-60	35-55	30-45	20-35	20-25	5-10
	3-14	Very gravelly loam.	GM-GC	A-2, A-4	15-30	40-65	35-60	35-50	25-40	20-25	5-10
	14-21	Very cobbly sandy clay loam.	SC, GC	A-2, A-6	30-45	50-75	50-70	50-65	30-45	30-35	10-15
	21-25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
315*:											
Abersito, cobbly	0-3	Very cobbly sandy clay loam.	SC, GC, CL	A-6	45-60	60-90	55-85	50-65	40-55	30-35	10-15
	3-9	Very cobbly fine sandy loam.	GM-GC, SC-SM	A-4, A-2	40-55	60-90	55-85	45-60	30-50	20-30	5-10
	9-24	Very cobbly clay	GC, CL, SC, CH	A-7	45-60	60-90	55-85	40-65	40-60	45-60	20-30
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Abersito--------	0-5	Gravelly loam----	CL	A-6	5-15	65-80	60-75	55-70	50-65	25-35	10-15
	5-24	Very cobbly clay	GC, CL, SC, CH	A-7	45-60	60-90	55-85	40-65	40-60	45-60	20-30
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
320-------------- Cinnadale	0-4	Gravelly very fine sandy loam.	SM, GM	A-2, A-4	0	65-80	60-75	55-70	30-50	20-25	NP-5
	4-12	Very channery loam, very channery silt loam.	GM	A-2, A-4	20-30	40-55	35-50	30-45	25-40	20-25	NP-5
	12-16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
325-------------- Moreno Variant	0-7	Loam-------------	SC-SM	A-4	0	95-100	90-100	45-55	40-50	20-25	5-10
	7-22	Very fine sandy loam.	SC-SM	A-4	0	95-100	90-100	80-90	35-40	20-25	5-10
	22-60	Sandy clay loam, clay loam.	SC	A-6	0	95-100	90-100	50-60	45-50	30-40	10-20
330-------------- Moreno	0-14	Loam-------------	CL	A-6	5-10	95-100	90-95	75-90	55-70	25-35	10-15
	14-35	Clay loam, clay, gravelly clay.	CL, CH	A-7	5-15	95-100	70-95	60-90	50-75	40-55	20-30
	35-60	Very gravelly clay loam.	GC	A-2	10-15	50-60	45-55	35-50	25-35	35-45	15-20
340-------------- Yankee	0-3	Silty clay loam	CL	A-6	0	100	100	95-100	85-95	35-40	15-20
	3-60	Clay, silty clay, silty clay loam.	CL, CH	A-7	0	100	100	90-100	75-95	40-60	20-30
350*:											
Rock outcrop.											
Stout-----------	0-3	Sandy loam-------	SM	A-2, A-4	0	80-100	75-100	55-75	25-40	20-25	NP-5
	3-14	Sandy loam-------	SM	A-2, A-4	0	80-100	75-100	55-75	25-40	20-25	NP-5
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
406*:											
Poley-----------	0-3	Very cobbly loam	GC, GM-GC, CL-ML, CL	A-4, A-6	30-45	60-75	55-70	50-65	40-55	20-30	5-15
	3-60	Clay, clay loam	CL, CH	A-7	0	95-100	90-100	80-90	70-80	40-60	25-35
Rock outcrop.											

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
407*:											
Viuda-----------	0-3	Very cobbly silty clay loam.	GC, CL	A-6, A-7	30-50	50-75	45-70	45-60	35-60	35-45	15-20
	3-13	Clay, sandy clay	CL, CH	A-7	0-10	95-100	90-100	55-75	50-65	40-55	20-30
	13-17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
419-------------- Navajo	0-3	Silty clay loam	CL	A-6	0	100	100	90-100	80-90	30-40	10-20
	3-60	Silty clay, clay	CL	A-7	0	100	100	90-100	80-90	40-50	20-35
420*:											
Navajo----------	0-4	Clay loam--------	CL	A-6	0	100	100	85-95	75-85	30-40	10-20
	4-60	Silty clay, clay	CL	A-7	0	100	100	90-100	80-90	40-50	20-35
Suwanee---------	0-3	Silty clay loam	CL	A-6	0	100	100	90-100	80-90	35-40	15-20
	3-60	Stratified silty clay to loamy fine sand.	CL	A-6	0	100	100	80-95	50-60	25-40	10-20
424*:											
Mespun----------	0-2	Fine sand--------	SM	A-2	0	100	100	75-95	20-35	---	NP
	2-60	Fine sand, loamy fine sand, loamy sand.	SM	A-2	0	100	100	70-90	15-35	---	NP
Palma-----------	0-4	Loamy fine sand	SM	A-2	0	100	100	50-75	20-30	15-20	NP-5
	4-60	Fine sandy loam, sandy loam.	SC-SM	A-4, A-2	0	100	100	65-75	30-40	15-25	5-10
426*:											
Sheppard--------	0-4	Loamy fine sand	SM	A-2	0	100	100	65-85	15-30	---	NP
	4-60	Loamy sand, loamy fine sand.	SM	A-2	0	100	100	65-85	15-30	---	NP
Shiprock--------	0-3	Sandy loam-------	SC-SM	A-2, A-4	0	100	100	75-90	30-50	20-30	5-10
	3-60	Sandy loam, fine sandy loam.	SC-SM	A-2, A-4	0	100	100	75-90	30-50	20-30	5-10
432*:											
Winona----------	0-3	Very gravelly loam.	GM-GC	A-2	15-25	45-65	40-60	30-45	20-35	20-25	5-10
	3-10	Very cobbly loam	GM-GC, SC-SM, GC	A-2, A-4, A-6	30-50	55-75	50-70	45-65	30-50	20-35	5-15
	10-14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
434*:											
Rizozo----------	0-2	Sandy loam-------	SC-SM, CL-ML	A-4	0-10	90-100	85-100	60-80	35-55	20-30	5-10
	2-10	Sandy loam, loam	SC-SM, CL-ML	A-4	0-10	90-100	85-100	65-85	40-60	25-30	5-10
	10-14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
446*:											
Harvey----------	0-2	Loam-------------	CL-ML	A-4	0	80-100	80-100	70-100	50-80	25-30	5-10
	2-60	Clay loam, loam	CL, SC	A-6	0	80-100	80-100	70-100	45-80	25-40	10-20
Oelop-----------	0-3	Loam-------------	CL	A-6	0	100	100	85-95	60-75	25-35	10-15
	3-60	Loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-100	65-85	25-40	10-20
476-------------- Saido	0-2	Loam-------------	CL-ML	A-4	0	100	100	80-90	65-75	20-30	5-10
	2-60	Gypsiferous material.	---	---	---	---	---	---	---	---	---
485*:											
Rock outcrop.											
Mion------------	0-3	Stony loam-------	CL-ML	A-4	15-40	90-100	80-90	60-70	50-60	25-30	5-10
	3-13	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	90-100	75-95	40-60	20-30
	13-17	Weathered bedrock	---	---	---	---	---	---	---	---	---
487*:											
Mion------------	0-1	Loam-------------	CL	A-6	0	100	100	80-90	70-85	30-35	10-15
	1-16	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	100	90-100	75-95	45-55	20-30
	16-20	Weathered bedrock	---	---	---	---	---	---	---	---	---
Badland.											
500*:											
Timhus----------	0-5	Extremely gravelly loam.	GC	A-2	0-10	20-30	15-25	10-20	10-15	25-30	10-15
	5-20	Very gravelly loam.	GC	A-2	0-10	35-55	30-50	20-35	15-30	25-30	10-15
	20-29	Extremely gravelly loam.	GC	A-2	0-10	20-30	15-25	10-20	10-15	25-30	10-15
	29-60	Cinders----------	GP	A-1	0	5-15	0-10	0-5	0-5	---	NP
Bandera---------	0-3	Very gravelly loam.	GM-GC	A-2	0	35-60	25-50	20-45	10-35	20-25	5-10
	3-16	Very gravelly loam, gravelly loam.	GM-GC	A-2	0	35-60	25-50	20-45	10-35	20-25	5-10
	16-60	Cinders----------	GP	A-1	0	5-15	0-10	0-5	0-5	---	NP
505*:											
Flugle----------	0-5	Loamy fine sand	SM	A-2, A-4	0	100	90-100	75-90	25-40	15-20	NP-5
	5-41	Sandy clay loam, clay loam, loam.	CL, SC	A-6	0	100	90-100	60-80	40-60	30-40	10-20
	41-61	Sandy loam, fine sandy loam.	SC-SM	A-2, A-4	0	100	90-100	50-60	30-40	20-30	5-10
Goesling--------	0-5	Loamy fine sand	SM	A-2, A-4	0	100	90-100	75-90	25-40	15-20	NP-5
	5-18	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	65-80	40-55	25-40	10-20
	18-60	Sandy loam, sandy clay loam, loam.	SC-SM, SC	A-2, A-4, A-1, A-6	0	100	100	40-55	20-40	25-35	5-15

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
514*:											
Raton-----------	0-5	Very cobbly loam	CL	A-6	50-60	85-95	80-90	75-85	60-75	30-35	10-15
	5-13	Very cobbly clay	CH, CL	A-7	50-60	85-95	80-90	75-90	65-80	45-55	20-30
	13-17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
515*:											
Rock outcrop.											
Vessilla---------	0-3	Sandy loam--------	SC-SM	A-2	0-10	100	100	60-75	25-35	20-30	5-10
	3-15	Sandy loam, fine sandy loam.	SC-SM	A-2, A-4	0-10	90-100	85-100	60-80	25-40	15-25	5-10
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mion------------	0-2	Loam-------------	CL	A-6	0	100	100	80-90	70-85	30-35	10-15
	2-11	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	100	90-100	75-95	45-55	20-30
	11-15	Weathered bedrock	---	---	---	---	---	---	---	---	---
518*:											
Borrego---------	0-3	Loam-------------	CL	A-6	0-5	100	100	90-100	70-80	30-40	10-20
	3-11	Gravelly clay, clay, clay loam.	CL	A-7	0	80-100	70-90	65-85	55-80	40-50	20-25
	11-15	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Charo-----------	0-2	Loam-------------	CL	A-6	0-15	95-100	90-100	75-90	65-80	30-35	10-15
	2-27	Clay loam, clay	CL, CH	A-7	0-15	95-100	90-100	85-95	75-85	40-60	20-30
	27-31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
520*:											
Celacy----------	0-2	Sandy loam--------	SC-SM	A-2, A-4	0-5	95-100	90-100	60-70	30-40	20-25	5-10
	2-24	Sandy clay loam, clay loam.	SC, CL	A-6	0	95-100	90-100	65-75	40-55	25-40	10-20
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Atarque---------	0-2	Fine sandy loam	SC-SM	A-4	0	100	100	70-85	40-50	20-25	5-10
	2-16	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-95	40-60	30-40	10-20
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
522*:											
Bandera, 30 to 45 percent slopes---------	0-8	Gravelly loam----	GM-GC	A-4	0	60-70	50-60	40-50	35-45	20-25	5-10
	8-18	Very gravelly loam.	GM-GC	A-2	0	35-60	25-50	20-45	10-35	20-25	5-10
	18-60	Cinders-----------	GP	A-1	0	5-15	0-10	0-5	0-5	---	NP

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
522*:											
Bandera, 15 to 30 percent slopes	0-9	Gravelly loam	GM-GC	A-4	0	60-70	50-60	40-50	35-45	20-25	5-10
	9-16	Very gravelly loam.	GM-GC	A-2	0	35-60	25-50	20-45	10-35	20-25	5-10
	16-60	Cinders	GP	A-1	0	5-15	0-10	0-5	0-5	---	NP
523*:											
Charo	0-2	Cobbly loam	CL	A-6	15-25	85-95	80-90	70-85	55-70	30-35	10-15
	2-28	Clay loam, clay	CL, CH	A-7	0-15	95-100	90-100	85-95	75-85	40-60	20-30
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Raton	0-7	Very cobbly loam	CL	A-6	50-60	85-95	80-90	75-85	60-75	30-35	10-15
	7-18	Very cobbly clay, very stony silty clay loam, extremely stony clay.	CH, CL	A-7	50-80	85-95	80-90	75-90	65-85	40-60	20-30
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
525*:											
Catman	0-3	Clay loam	CL	A-6, A-7	0	100	100	65-95	50-80	30-45	10-20
	3-60	Clay	CH	A-7	0	100	100	90-100	80-90	60-70	30-40
Silkie	0-4	Clay loam	CL	A-6, A-7	0	100	100	90-100	70-80	35-45	15-20
	4-60	Clay, clay loam	CL, CH	A-7	0	100	100	85-95	70-90	40-55	15-30
535 Millpaw	0-3	Loam	CL	A-6	0	100	100	80-90	65-75	25-35	10-15
	3-29	Clay loam, clay, sandy clay.	CL, CH	A-7	0	100	100	85-95	75-90	40-55	20-30
	29-60	Sandy clay loam, clay loam, loam.	CL	A-6	0	95-100	90-100	70-90	50-70	25-40	10-20
536 McGaffey	0-3	Loam	CL	A-6	0	100	100	85-100	60-80	30-35	10-15
	3-60	Loam, clay loam	CL	A-6	0	100	100	80-95	55-75	30-35	10-15
537*:											
Millpaw	0-2	Loam	CL	A-6	0	100	100	80-90	65-75	25-35	10-15
	2-37	Clay loam, clay, sandy clay.	CL, CH	A-7	0	100	100	85-95	75-90	40-55	20-30
	37-60	Sandy clay loam, clay loam, loam.	CL	A-6	0	95-100	90-100	70-90	50-70	25-40	10-20
Loarc	0-4	Fine sandy loam	SM, ML	A-4	0	100	95-100	80-90	45-55	20-25	NP-5
	4-60	Sandy clay loam, clay loam, gravelly sandy loam.	CL	A-6	0	75-90	70-85	60-75	50-60	25-40	10-20
540 Montecito	0-5	Fine sandy loam	SC-SM	A-4, A-2	0-15	95-100	90-100	50-70	30-50	20-30	5-10
	5-30	Clay loam, clay	CL, CH	A-7	0-10	90-100	85-100	65-80	55-70	40-55	20-30
	30-60	Gravelly clay loam, gravelly sandy clay, clay loam.	CL, CH	A-7	10-15	65-90	60-85	55-75	50-70	40-55	20-30

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
550*:											
Nogal-----------	0-1	Sandy loam-------	SC-SM	A-4	0	95-100	90-100	60-80	35-50	20-25	5-10
	1-31	Clay, clay loam, gravelly clay.	CL, CH, SC	A-7	0	85-100	60-100	50-70	40-60	45-60	20-30
	31-35	Weathered bedrock	---	---	---	---	---	---	---	---	---
Galestina-------	0-2	Sandy loam-------	SC-SM	A-2, A-4	0	100	100	60-75	30-45	20-30	5-10
	2-7	Loam, sandy clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	100	100	85-95	60-75	25-35	5-15
	7-46	Clay, clay loam	CL, CH	A-6, A-7	0	100	100	90-100	75-95	35-55	15-30
	46-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
555*:											
Pinitos---------	0-2	Sandy loam-------	SC-SM	A-2, A-4	0	100	100	60-70	30-40	20-25	5-10
	2-24	Sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	75-85	45-55	30-40	10-20
	24-60	Sandy loam, sandy clay loam.	SC-SM, SC	A-2, A-4, A-6	0	100	100	65-80	30-50	20-30	5-15
Ribera----------	0-3	Sandy loam-------	CL-ML, SC-SM	A-4	0	100	100	70-90	40-60	20-25	5-10
	3-39	Clay loam, sandy clay loam.	CL	A-6	0	100	100	85-95	50-75	30-35	10-15
	39-43	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
560*:											
Flugle----------	0-5	Loamy fine sand, fine sandy loam.	SM	A-2, A-4	0	100	90-100	75-90	25-40	15-20	NP-5
	5-37	Sandy clay loam, clay loam, loam.	CL, SC	A-6	0	100	90-100	60-80	40-60	30-40	10-20
	37-60	Sandy loam, fine sandy loam.	SC-SM	A-2, A-4	0	100	90-100	50-60	30-40	20-30	5-10
Teco------------	0-2	Sandy loam-------	SC-SM	A-2, A-4	0	100	100	60-70	30-40	20-30	5-10
	2-18	Clay, clay loam, sandy clay.	CL	A-7	0	95-100	90-100	80-100	60-80	40-50	20-25
	18-60	Gravelly very fine sandy loam, clay loam, sandy clay loam.	SC-SM, CL, GM-GC, SC	A-2, A-4, A-6	0-5	60-95	55-90	45-80	25-60	25-35	5-15
561*:											
Flugle----------	0-2	Sandy loam-------	SC-SM	A-2, A-4	0	100	90-100	50-60	30-40	20-25	5-10
	2-47	Sandy clay loam, clay loam, loam.	CL, SC	A-6	0	100	90-100	60-80	40-60	30-40	10-20
	47-60	Sandy loam, fine sandy loam.	SC-SM	A-2, A-4	0	100	90-100	50-60	30-40	20-30	5-10
Quintana--------	0-11	Fine sandy loam	CL-ML	A-4	0	100	100	75-90	50-65	20-30	5-10
	11-46	Sandy clay loam, loam, clay loam.	CL	A-6	0	100	100	70-85	55-70	30-40	10-20
	46-60	Sandy loam, fine sandy loam.	CL-ML, SC-SM	A-4	0	100	100	65-80	45-65	20-30	5-10
565-------------- Quintana	0-4	Sandy loam-------	CL-ML, SC-SM	A-4	0	100	100	65-80	45-60	20-30	5-10
	4-21	Sandy clay loam, loam, clay loam.	CL	A-6	0	100	100	70-85	55-70	30-40	10-20
	21-60	Sandy loam, fine sandy loam.	CL-ML, SC-SM	A-4	0	100	100	65-80	45-65	20-30	5-10

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
570*:											
Torreon---------	0-2	Very cobbly loam	SC-SM, GM-GC	A-2, A-4	30-45	50-75	45-70	40-55	30-45	25-30	5-10
	2-25	Clay loam, clay	CL, CH	A-7	0-10	95-100	90-100	80-95	75-90	40-55	20-30
	25-60	Silty clay loam	CL	A-6, A-7	0-10	95-100	90-100	80-95	70-85	35-45	15-20
Rock outcrop.											
Cabezon---------	0-3	Very cobbly loam	SC, GC	A-6	40-55	55-85	50-80	40-60	35-50	25-35	10-15
	3-13	Clay loam, clay, sandy clay.	CL, CH	A-7	10-25	85-95	80-90	70-80	60-75	40-60	20-30
	13-17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
575*:											
Teco------------	0-6	Fine sandy loam	SC-SM	A-2, A-4	0	100	100	60-70	30-40	20-30	5-10
	6-24	Clay, clay loam, sandy clay.	CL	A-7	0	95-100	90-100	80-100	60-80	40-50	20-25
	24-60	Gravelly very fine sandy loam, clay loam, sandy clay loam.	SC-SM, CL, GM-GC, SC	A-2, A-4, A-6	0-5	60-95	55-90	45-80	25-60	25-35	5-15
Atarque---------	0-3	Fine sandy loam	SC-SM	A-4	0	100	100	70-85	40-50	20-25	5-10
	3-19	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	80-95	40-60	30-40	10-20
	19-23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
576-------------- Teco	0-3	Sandy loam-------	SC-SM	A-2, A-4	0	100	100	60-70	30-40	20-30	5-10
	3-60	Clay, clay loam, sandy clay.	CL	A-7	0	95-100	90-100	80-100	60-80	40-50	20-25
577*:											
Cabezon---------	0-2	Very cobbly loam	SC, GC	A-6	40-55	55-85	50-80	40-60	35-50	25-35	10-15
	2-18	Cobbly clay loam, clay, sandy clay.	CL, CH	A-7	10-25	85-95	80-90	70-80	60-75	40-60	20-30
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Montecito-------	0-3	Clay loam--------	CL	A-6	0-15	95-100	90-100	80-90	55-65	30-35	10-15
	3-24	Clay loam--------	CL	A-7	0-10	90-100	85-100	75-85	60-70	40-45	15-20
	24-60	Sandy clay-------	SC, CL	A-7	0-10	90-100	85-100	60-70	40-55	40-45	15-20
Rock outcrop.											
579*:											
Cabezon---------	0-2	Very cobbly sandy loam.	SC-SM, GM-GC	A-2	40-55	55-85	50-80	35-55	25-35	20-30	5-10
	2-14	Cobbly clay loam, clay, sandy clay.	CL, CH	A-7	10-25	85-95	80-90	70-80	60-75	40-60	20-30
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
579*:											
Cantina	0-2	Sandy loam	SC-SM	A-2, A-4	0	100	100	60-75	30-40	25-30	5-10
	2-9	Sandy clay loam	SC	A-6	0	100	100	65-80	35-50	30-40	10-20
	9-31	Sandy clay, clay	CL, CH	A-7	0	100	100	70-85	55-70	40-60	15-30
	31-54	Sandy clay loam, sandy clay.	SC, CL	A-6, A-7	0	100	100	65-80	35-55	30-45	10-20
	54-58	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
581*:											
Laporte	0-1	Gravelly loam	CL-ML, ML, GM, GM-GC	A-4	0-15	60-90	60-75	45-60	40-55	20-30	NP-10
	1-18	Gravelly loam, cobbly loam.	CL-ML, SC-SM, CL, SC	A-4, A-6	10-25	70-90	65-85	50-70	45-60	25-35	5-15
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Vessilla	0-6	Sandy loam	SC-SM	A-2	0-10	100	100	60-75	25-35	20-30	5-10
	6-18	Sandy loam, fine sandy loam.	SC-SM	A-2, A-4	0-10	90-100	85-100	60-80	25-40	15-25	5-10
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
582 Kenray	0-15	Fine sand	SM	A-2	0	100	100	80-95	20-30	---	NP
	15-60	Loamy sand, fine sand, sand.	SM	A-2, A-4	0	100	100	65-85	10-40	---	NP
585 Moncha	0-2	Silt loam	CL-ML	A-4	0	100	100	95-100	80-95	25-30	5-10
	2-21	Silty clay loam, silt loam.	CL	A-6	0	100	100	95-100	80-95	30-35	10-15
	21-60	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6	0	100	100	95-100	80-95	25-35	5-15
586*:											
Venadito	0-3	Clay loam	CL	A-6, A-7	0	100	100	85-95	75-85	35-45	15-20
	3-60	Clay	CH	A-7	0	100	100	95-100	85-95	55-65	30-40
Teco	0-3	Clay loam	CL	A-6	0	100	100	90-100	70-80	35-40	15-20
	3-60	Clay, clay loam, sandy clay.	CL	A-7	0	95-100	90-100	80-100	60-80	40-50	20-25
591*:											
Valnor	0-2	Clay loam	CL	A-6	0	90-100	75-100	60-75	50-65	30-40	10-20
	2-38	Clay, clay loam, sandy clay.	CL, CH	A-7	0	100	75-100	75-85	60-80	40-55	20-30
	38-42	Weathered bedrock	---	---	---	---	---	---	---	---	---
Techado	0-3	Channery clay loam.	CL, SC, GC	A-6	0	55-80	50-75	45-60	40-55	30-40	10-20
	3-16	Clay	CL, CH	A-7	0	80-100	75-100	70-85	65-80	40-55	20-35
	16-20	Weathered bedrock	---	---	---	---	---	---	---	---	---
610*:											
Grieta	0-8	Sandy loam	SC-SM	A-2, A-4	0	100	100	65-80	25-45	20-30	5-10
	8-28	Sandy clay loam, clay loam, fine sandy loam.	SC	A-6	0	90-100	85-100	75-90	35-50	25-40	10-20
	28-60	Sandy loam, coarse sandy loam.	SM, SC-SM	A-2	0	90-100	85-100	50-70	20-35	15-30	NP-10

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
610*:											
Shiprock	0-3	Sandy loam	SC-SM	A-2, A-4	0	100	100	75-90	30-50	20-30	5-10
	3-60	Sandy loam, fine sandy loam.	SC-SM	A-2, A-4	0	100	100	75-90	30-50	20-30	5-10
611*:											
Grieta	0-3	Sandy loam	SC-SM	A-2, A-4	0	100	100	65-80	25-45	20-30	5-10
	3-60	Sandy clay loam, clay loam, fine sandy loam.	SC	A-6	0	90-100	85-100	75-90	35-50	25-40	10-20
Kiki	0-6	Sandy loam	SC-SM	A-4	0	80-100	75-100	60-80	35-50	20-30	5-10
	6-14	Sandy clay loam, clay loam.	SC, CL	A-6	0	100	100	70-85	40-55	35-40	15-20
	14-24	Sandy clay loam, loam, clay loam.	SC, CL	A-6	0	100	100	65-80	35-55	30-40	10-15
	24-28	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
615*:											
Trag	0-2	Cobbly loam	CL-ML	A-4	15-25	85-95	80-90	70-80	50-60	20-30	5-10
	2-35	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-15	90-100	90-100	70-95	50-75	20-35	5-15
	35-60	Cobbly sandy loam	SM	A-2, A-4	15-30	85-90	75-90	50-70	25-40	20-25	NP-5
Techado	0-2	Cobbly clay loam	CL	A-6	15-30	80-100	70-90	60-80	50-70	30-40	10-20
	2-19	Clay loam, sandy clay.	CL	A-6, A-7	0	80-100	75-100	70-85	65-80	30-45	15-25
	19-38	Weathered bedrock	---	---	---	---	---	---	---	---	---
	38-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
618 Netoma	0-12	Sandy loam	SM, SC-SM	A-2, A-4	0	95-100	90-100	60-80	30-50	20-30	NP-10
	12-60	Gypsiferous material.	---	---	---	---	---	---	---	---	---
619 Venadito	0-4	Clay loam	CL	A-6, A-7	0	100	100	85-95	75-85	35-45	15-20
	4-60	Clay	CH	A-7	0	100	100	95-100	85-95	55-65	30-40
620*:											
Aparejo	0-2	Silt loam	CL	A-6	0	100	100	85-95	70-85	25-30	10-15
	2-18	Silty clay loam, silt loam, clay loam.	CL	A-6	0	100	100	90-100	80-90	25-40	10-20
	18-60	Silt loam, sandy clay loam, clay loam.	CL	A-6	0	100	100	85-100	65-85	25-35	10-15
Venadito	0-3	Silty clay loam	CL	A-6, A-7	0	100	100	95-100	80-90	35-45	15-20
	3-60	Clay	CH	A-7	0	100	100	95-100	85-95	55-65	30-40
625*:											
Hagerman	0-6	Fine sandy loam	SC-SM	A-4	0	95-100	90-100	65-80	35-50	20-30	5-10
	6-34	Sandy clay loam, clay loam, sandy loam.	SC, CL	A-6	0	95-100	90-100	70-80	45-60	25-40	10-20
	34-38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
625*:											
Bond	0-5	Sandy loam	SM	A-2, A-4	0-15	100	95-100	60-75	30-50	15-25	NP-5
	5-18	Sandy clay loam, clay loam, loam.	SC, CL	A-2, A-6	0-15	80-100	70-100	60-75	30-60	20-35	10-20
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
630*:											
Bond	0-2	Sandy loam	SM	A-2, A-4	0-15	100	95-100	60-75	30-50	15-25	NP-5
	2-19	Sandy clay loam, clay loam, loam.	SC, CL	A-2, A-6	0-15	80-100	70-100	60-75	30-60	20-35	10-20
	19-23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rizozo	0-2	Loam	CL, SC	A-6	0	80-95	75-90	65-85	45-75	25-35	10-15
	2-14	Loam, silt loam	GC, SC, CL	A-6	0-15	65-90	60-85	45-75	35-60	25-35	10-15
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
640*:											
Flaco	0-2	Loam	CL-ML, CL	A-4, A-6	0	80-100	75-100	65-90	55-70	20-35	5-15
	2-11	Loam, clay loam	CL	A-6	0-15	100	100	75-85	60-75	25-40	10-20
	11-29	Loam, clay loam, gravelly loam.	CL	A-6	0-15	75-100	65-100	60-85	50-75	25-35	10-15
	29-33	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Berto	0-2	Loam	CL-ML	A-4	0-10	95-100	90-100	65-80	50-65	20-30	5-10
	2-11	Loam, clay loam	CL	A-6	0-10	95-100	90-100	70-85	55-70	25-35	10-15
	11-18	Cobbly loam, loam, cobbly clay loam.	CL	A-6	10-15	85-95	80-90	65-75	50-60	25-35	10-15
	18-22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
641*:											
Berto	0-2	Cobbly loam	CL-ML	A-4	15-25	95-100	90-100	65-80	50-65	20-30	5-10
	2-8	Loam, clay loam	CL	A-6	0-10	95-100	90-100	70-85	55-70	25-35	10-15
	8-16	Cobbly loam, loam, cobbly clay loam.	CL	A-6	10-15	85-95	80-90	65-75	50-60	25-35	10-15
	16-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Flaco	0-2	Cobbly loam	CL-ML, CL	A-4, A-6	20-25	70-95	60-90	60-75	50-65	20-30	5-15
	2-9	Loam, clay loam	CL	A-6	0-15	100	100	75-85	60-75	25-40	10-20
	9-26	Loam, clay loam, gravelly loam.	CL	A-6	0-15	75-100	65-100	60-85	50-75	25-35	10-15
	26-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
645*:											
Penistaja	0-3	Sandy loam	SC-SM, CL-ML	A-4	0	100	100	90-100	40-60	20-30	5-10
	3-18	Sandy clay loam, clay loam.	CL, SC	A-6	0	100	100	95-100	45-75	30-35	10-15
	18-60	Sandy loam, fine sandy loam, sandy clay loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	100	100	70-95	30-55	20-30	5-15

See footnote at end of table.

TABLE 12.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
645*:											
Oelop-----------	0-3	Loam-------------	CL	A-6	0	100	100	85-95	60-75	25-35	10-15
	3-60	Loam, clay loam, silty clay loam.	CL	A-6	0	100	100	85-100	65-85	25-40	10-20
650*:											
Winona----------	0-3	Very gravelly loam.	GM-GC	A-2	15-25	45-65	40-60	30-45	20-35	20-25	5-10
	3-15	Very cobbly loam	GM-GC, SC-SM, GC	A-2, A-4, A-6	30-50	55-75	50-70	45-65	30-50	20-35	5-15
	15-19	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Tanbark---------	0-2	Loam-------------	CL	A-6	0	100	100	90-100	70-90	25-35	10-15
	2-17	Gypsiferous material.	---	---	---	---	---	---	---	---	---
	17-21	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
660*:											
Rana------------	0-3	Very cobbly clay	CH	A-7	45-55	75-90	70-85	65-80	60-75	60-70	30-40
	3-34	Clay-------------	CH	A-7	0	100	100	90-100	90-100	65-75	35-45
	34-60	Clay-------------	CH	A-7	0	95-100	90-100	85-95	80-90	65-75	35-45
Rock outcrop.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
10*. Lava flows												
20---------------- Penistaja	0-6	10-20	1.35-1.45	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low--------	0.28	5	3	.8-2
	6-60	20-30	1.40-1.50	0.6-2.0	0.15-0.18	6.6-8.4	<2	Low--------	0.32			
21---------------- Clovis	0-8	15-25	1.40-1.50	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.37	5	5	.9-2
	8-60	20-35	1.40-1.50	0.6-2.0	0.14-0.18	6.6-9.0	<2	Moderate	0.32			
25*:												
Hickman----------	0-4	15-27	1.05-1.15	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low--------	0.37	5	5	2-4
	4-60	18-35	1.20-1.30	0.2-0.6	0.14-0.16	7.4-9.0	<2	Moderate	0.32			
Catman-----------	0-12	30-40	1.40-1.50	0.2-0.6	0.19-0.21	6.6-7.8	2-8	Moderate	0.37	5	4L	.5-.9
	12-60	60-75	1.15-1.25	<0.06	0.13-0.15	6.6-8.4	2-8	High-------	0.20			
30---------------- Warm Springs	0-8	10-20	1.30-1.35	0.6-2.0	0.10-0.12	7.4-8.4	2-8	Low--------	0.37	3	4L	4-7
	8-36	18-25	1.25-1.30	0.6-2.0	0.08-0.12	7.9-9.0	2-8	Low--------	0.28			
	36-60	18-25	1.25-1.30	0.6-2.0	0.09-0.12	8.5-9.0	2-8	Low--------	0.28			
40---------------- Aparejo	0-6	30-39	1.20-1.30	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.32	5	4L	.5-.9
	6-47	18-35	1.20-1.30	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.37			
	47-60	18-30	1.20-1.30	0.6-2.0	0.14-0.21	7.9-8.4	2-4	Low--------	0.32			
41---------------- Aparejo	0-6	28-35	1.50-1.55	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.32	5	4L	.5-.9
	6-42	25-35	1.50-1.55	0.2-0.6	0.15-0.20	7.9-8.4	2-4	Moderate	0.32			
	42-60	5-35	1.30-1.35	2.0-6.0	0.08-0.12	7.9-8.4	2-4	Low--------	0.28			
45---------------- Aparejo	0-15	40-50	1.50-1.55	0.06-0.2	0.14-0.16	7.9-8.4	2-4	High-------	0.20	5	4	.5-.9
	15-38	18-35	1.20-1.30	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.37			
	38-60	18-30	1.20-1.30	0.6-2.0	0.14-0.21	7.9-8.4	2-4	Low--------	0.32			
50---------------- Venadito	0-14	30-39	1.40-1.50	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	0.32	5	4L	<1
	14-60	60-80	1.15-1.25	<0.06	0.14-0.16	7.9-8.4	2-4	High-------	0.20			
51---------------- Venadito	0-19	25-34	1.40-1.50	0.6-2.0	0.14-0.16	7.9-8.4	<2	Low--------	0.32	5	5	<1
	19-60	60-80	1.15-1.25	<0.06	0.14-0.16	7.9-8.4	2-4	High-------	0.20			
52---------------- Venadito Variant	0-3	30-39	1.40-1.45	0.2-0.6	0.19-0.21	6.6-7.3	<2	Moderate	0.32	2	4L	.5-.9
	3-35	60-70	1.20-1.25	<0.06	0.14-0.16	6.6-7.8	<2	High-------	0.20			
	35-39	---	---	---	---	---	---	-----------	----			
55*:												
Glenberg---------	0-11	10-18	1.45-1.50	2.0-6.0	0.10-0.13	7.4-7.8	<4	Low--------	0.24	5	3	.5-1
	11-21	10-18	1.50-1.60	2.0-6.0	0.10-0.13	7.9-8.4	<4	Low--------	0.24			
	21-60	8-18	1.50-1.60	2.0-6.0	0.09-0.12	7.9-8.4	<4	Low--------	0.17			
San Mateo--------	0-4	20-30	1.35-1.45	0.6-2.0	0.14-0.16	7.4-8.4	<2	Low--------	0.32	5	4L	.5-.9
	4-60	18-35	1.35-1.45	0.6-2.0	0.15-0.17	7.4-9.0	2-4	Moderate	0.32			
56---------------- Mespun	0-2	2-10	1.35-1.45	>20	0.06-0.08	6.1-7.8	<2	Low--------	0.17	5	2	.3-.5
	2-60	3-10	1.35-1.45	6.0-20	0.05-0.09	6.1-7.8	<2	Low--------	0.17			
57---------------- San Mateo	0-6	27-35	1.35-1.45	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.24	5	4L	.5-.9
	6-60	18-35	1.35-1.45	0.6-2.0	0.15-0.17	7.4-9.0	2-4	Moderate	0.32			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
58---------------- San Mateo	0-4	20-30	1.35-1.45	0.6-2.0	0.14-0.16	7.4-8.4	<2	Low--------	0.32	5	4L	.5-.9
	4-47	20-35	1.35-1.45	0.6-2.0	0.15-0.17	7.4-8.4	2-4	Moderate	0.32			
	47-60	18-35	1.35-1.45	0.6-2.0	0.15-0.17	7.4-9.0	2-4	Moderate	0.32			
60---------------- Sparank	0-10	30-40	1.35-1.45	0.2-0.6	0.19-0.21	7.4-8.4	2-4	Moderate	0.32	5	4L	1-2
	10-60	35-50	1.50-1.60	<0.06	0.16-0.18	7.4-8.4	2-4	High-------	0.37			
61---------------- Sparham	0-10	30-40	1.35-1.40	0.2-0.6	0.19-0.21	7.4-7.8	4-8	Moderate	0.32	5	4L	.7-.9
	10-60	40-60	1.30-1.35	<0.06	0.14-0.17	7.4-7.8	4-16	High-------	0.24			
62---------------- Sparank	0-5	25-35	1.30-1.40	0.6-2.0	0.04-0.06	7.9-9.0	>16	Moderate	0.32	5	5	1-2
	5-60	35-50	1.35-1.45	<0.06	0.04-0.06	7.9-9.0	>16	High-------	0.37			
66---------------- Zia	0-8	8-20	1.45-1.55	2.0-6.0	0.12-0.14	7.4-8.4	<2	Low--------	0.28	5	3	.5-.9
	8-60	8-20	1.50-1.60	2.0-6.0	0.11-0.14	7.4-8.4	<2	Low--------	0.28			
70---------------- Catman	0-6	25-40	1.40-1.50	0.2-0.6	0.14-0.20	6.6-7.8	2-8	Moderate	0.32	5	4L	.5-.9
	6-60	60-75	1.15-1.25	<0.06	0.13-0.15	6.6-8.4	2-8	High-------	0.20			
72---------------- Catman Variant	0-10	30-40	1.35-1.40	0.2-0.6	0.13-0.14	7.9-8.4	4-8	Moderate	0.32	5	4L	.5-.9
	10-60	60-70	1.20-1.25	<0.06	0.07-0.11	7.9-8.4	4-16	High-------	0.20			
73---------------- Catman	0-10	25-40	1.40-1.50	0.2-0.6	0.14-0.20	6.6-7.8	2-8	Moderate	0.32	5	4L	.5-.9
	10-60	60-75	1.15-1.25	<0.06	0.13-0.15	6.6-8.4	2-8	High-------	0.20			
75---------------- Hickman	0-6	28-35	1.20-1.30	0.2-0.6	0.18-0.20	7.4-8.4	<2	Moderate	0.32	5	6	2-4
	6-60	18-35	1.20-1.30	0.2-0.6	0.14-0.16	7.4-9.0	<2	Moderate	0.32			
100--------------- Manzano	0-4	10-25	1.20-1.30	0.6-2.0	0.16-0.18	6.6-7.8	<2	Low--------	0.37	5	6	2-3
	4-60	18-34	1.40-1.50	0.2-0.6	0.17-0.20	7.4-8.4	<2	Moderate	0.37			
120*: Rock outcrop.												
Laporte----------	0-2	15-25	1.35-1.40	0.6-2.0	0.08-0.12	7.4-8.4	<2	Low--------	0.10	1	7	1-2
	2-11	15-27	1.35-1.40	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low--------	0.20			
	11-15	---	---	0.00-0.2	---	---	---	-----------	----			
130*: Laporte----------	0-3	12-20	1.35-1.40	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low--------	0.20	1	5	1-2
	3-11	15-27	1.35-1.40	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low--------	0.20			
	11-15	---	---	0.00-0.2	---	---	---	-----------	----			
Rock outcrop.												
200--------------- Penistaja	0-2	10-20	1.35-1.45	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low--------	0.28	5	3	.8-2
	2-22	20-30	1.40-1.50	0.6-2.0	0.15-0.18	6.6-8.4	<2	Low--------	0.32			
	22-60	15-25	1.20-1.30	2.0-6.0	0.12-0.15	6.6-8.4	<2	Low--------	0.28			
205--------------- Ildefonso	0-3	8-18	1.45-1.55	2.0-6.0	0.04-0.08	7.4-7.8	<2	Low--------	0.10	5	6	.5-2
	3-60	20-25	1.45-1.55	2.0-6.0	0.04-0.08	7.9-9.0	<2	Low--------	0.10			
210*: Bond-------------	0-7	8-17	1.45-1.55	0.6-2.0	0.12-0.14	6.6-7.8	<2	Low--------	0.28	1	3	.8-1
	7-16	20-35	1.45-1.55	0.2-0.6	0.11-0.13	6.6-8.4	<2	Moderate	0.28			
	16-20	---	---	---	---	---	---	-----------	----			
Penistaja--------	0-3	10-20	1.35-1.45	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low--------	0.28	5	3	.8-2
	3-30	20-30	1.40-1.50	0.6-2.0	0.15-0.18	6.6-8.4	<2	Low--------	0.32			
	30-60	15-25	1.20-1.30	2.0-6.0	0.12-0.15	6.6-8.4	<2	Low--------	0.28			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
210*:												
Rock outcrop.												
218*:												
Viuda-----------	0-3	10-20	1.35-1.40	2.0-6.0	0.05-0.07	7.4-7.8	<2	Low--------	0.10	1	6	.5-.9
	3-16	35-50	1.40-1.45	0.06-0.2	0.14-0.17	7.9-8.4	<2	High-------	0.20			
	16-19	20-35	1.45-1.50	0.6-2.0	0.15-0.17	7.9-8.4	<2	Moderate	0.15			
	19-23	---	---	---	---	---	---	-----------	----			
Penistaja-------	0-2	10-20	1.35-1.45	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low--------	0.28	5	3	.8-2
	2-24	20-30	1.40-1.50	0.6-2.0	0.15-0.18	6.6-8.4	<2	Low--------	0.32			
	24-60	15-25	1.20-1.30	2.0-6.0	0.12-0.15	6.6-8.4	<2	Low--------	0.28			
Rock outcrop.												
230*:												
Dumps.												
Pits.												
251*:												
Skyvillage------	0-4	10-15	1.35-1.45	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low--------	0.28	1	3	1-2
	4-12	10-18	1.45-1.55	2.0-6.0	0.14-0.16	7.4-8.4	<2	Low--------	0.32			
	12-16	---	---	---	---	---	---	-----------	----			
Rock outcrop.												
Bond------------	0-4	8-17	1.45-1.55	0.6-2.0	0.12-0.14	6.6-7.8	<2	Low--------	0.28	1	3	.8-1
	4-10	20-35	1.45-1.55	0.2-0.6	0.11-0.13	6.6-8.4	<2	Moderate	0.28			
	10-14	---	---	---	---	---	---	-----------	----			
257*:												
Sparank---------	0-2	30-40	1.35-1.45	0.2-0.6	0.19-0.21	7.4-8.4	2-4	Moderate	0.32	5	4L	1-2
	2-60	35-50	1.50-1.60	<0.06	0.16-0.18	7.4-8.4	2-4	High-------	0.37			
San Mateo-------	0-2	15-25	1.35-1.45	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low--------	0.37	5	4L	.5-.9
	2-29	20-35	1.35-1.45	0.6-2.0	0.15-0.17	7.4-8.4	2-4	Moderate	0.32			
	29-60	18-35	1.35-1.45	0.6-2.0	0.15-0.17	7.4-9.0	2-4	Moderate	0.32			
259-------------- Mikim	0-4	10-25	1.40-1.45	0.6-2.0	0.16-0.18	6.6-8.4	<2	Low--------	0.32	5	5	1-3
	4-60	18-32	1.35-1.45	0.6-2.0	0.14-0.16	7.4-9.0	<2	Low--------	0.32			
262*:												
Poley-----------	0-2	15-25	1.20-1.25	0.6-2.0	0.06-0.12	6.1-7.8	<2	Moderate	0.10	5	8	1-2
	2-18	35-55	1.35-1.45	0.06-0.2	0.12-0.21	6.1-8.4	<4	High-------	0.20			
	18-60	15-25	1.45-1.55	0.6-2.0	0.14-0.18	7.9-8.4	<4	Moderate	0.37			
Pojoaque--------	0-3	18-27	1.30-1.35	0.6-2.0	0.08-0.10	7.4-7.8	<2	Low--------	0.10	5	6	.5-.9
	3-60	20-30	1.50-1.55	0.6-2.0	0.12-0.15	7.4-8.4	<2	Low--------	0.15			
264-------------- Tapia	0-4	10-18	1.30-1.35	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low--------	0.24	4	3	.5-.9
	4-23	20-35	1.50-1.55	0.6-2.0	0.15-0.20	7.4-8.4	<2	Moderate	0.32			
	23-40	15-25	1.50-1.55	2.0-6.0	0.11-0.14	7.9-8.4	<2	Low--------	0.15			
	40-60	0-10	1.30-1.35	6.0-20	0.04-0.06	7.9-8.4	<2	Low--------	0.05			
270-------------- Charo	0-5	20-27	1.30-1.40	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low--------	0.37	2	6	1-2
	5-28	35-60	1.35-1.45	0.06-0.2	0.15-0.18	6.6-7.8	<2	Moderate	0.28			
	28-32	---	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
272*:												
Cebolleta-------	0-2	15-25	1.15-1.25	0.6-2.0	0.12-0.14	6.1-7.3	<2	Low-------	0.20	2	6	1-2
	2-8	20-40	1.20-1.30	0.2-0.6	0.09-0.11	6.1-7.3	<2	Moderate	0.10			
	8-25	40-60	1.30-1.40	0.06-0.2	0.08-0.10	6.1-7.8	<2	High------	0.05			
	25-29	---	---	---	---	---	---	----------	----			
Borrego---------	0-4	18-27	1.20-1.30	0.6-2.0	0.13-0.15	6.1-7.3	<2	Low-------	0.20	1	7	2-4
	4-18	35-45	1.40-1.50	<0.06	0.10-0.12	5.6-7.8	<2	High------	0.20			
	18-22	---	---	---	---	---	---	----------	----			
Rock outcrop.												
276-------------- Trag	0-3	15-25	1.20-1.30	0.6-2.0	0.14-0.16	6.1-7.3	<2	Low-------	0.24	5	5	2-4
	3-24	18-35	1.40-1.50	0.6-2.0	0.14-0.16	6.1-7.8	<2	Moderate	0.32			
	24-60	18-30	1.40-1.50	0.6-2.0	0.12-0.16	6.1-7.8	<2	Moderate	0.28			
278*:												
Microy----------	0-3	15-27	1.40-1.50	0.6-2.0	0.12-0.14	6.6-7.3	<2	Low-------	0.20	2	7	1-2
	3-28	35-50	1.35-1.45	0.06-0.2	0.10-0.12	6.6-7.8	<2	High------	0.10			
	28-36	40-50	1.40-1.50	0.06-0.2	0.09-0.11	7.4-7.8	<2	High------	0.05			
	36-40	---	---	---	---	---	---	----------	----			
Rock outcrop.												
282-------------- Cebolleta	0-4	15-25	1.15-1.25	0.6-2.0	0.12-0.14	6.1-7.3	<2	Low-------	0.20	2	6	1-2
	4-10	20-40	1.20-1.30	0.2-0.6	0.09-0.11	6.1-7.3	<2	Moderate	0.10			
	10-25	40-60	1.30-1.40	0.06-0.2	0.08-0.10	6.1-7.8	<2	High------	0.05			
	25-29	---	---	---	---	---	---	----------	----			
284*:												
Cebolleta-------	0-5	15-25	1.15-1.25	0.6-2.0	0.08-0.10	6.1-7.3	<2	Low-------	0.10	2	7	1-2
	5-10	20-40	1.20-1.30	0.2-0.6	0.09-0.11	6.1-7.3	<2	Moderate	0.10			
	10-24	40-60	1.30-1.40	0.06-0.2	0.08-0.10	6.1-7.3	<2	High------	0.05			
	24-28	---	---	---	---	---	---	----------	----			
Rock outcrop.												
286*:												
Cebolleta-------	0-3	15-25	1.15-1.25	0.6-2.0	0.08-0.10	6.1-7.3	<2	Low-------	0.10	2	7	1-2
	3-9	20-40	1.20-1.30	0.2-0.6	0.09-0.11	6.1-7.3	<2	Moderate	0.10			
	9-28	40-60	1.30-1.40	0.06-0.2	0.08-0.10	6.1-7.3	<2	High------	0.05			
	28-32	---	---	---	---	---	---	----------	----			
Raton-----------	0-3	20-27	1.20-1.30	0.2-0.6	0.10-0.12	6.6-7.3	<2	Low-------	0.24	1	7	2-4
	3-10	35-55	1.35-1.45	0.06-0.2	0.08-0.09	6.6-7.3	<2	High------	0.10			
	10-14	---	---	---	---	---	---	----------	----			
290*:												
Paguate---------	0-3	18-26	1.15-1.25	0.6-2.0	0.14-0.18	6.6-7.8	<2	Low-------	0.37	2	6	1-2
	3-8	30-40	1.40-1.50	0.2-0.6	0.16-0.21	6.6-7.8	<2	Moderate	0.32			
	8-19	40-50	1.35-1.45	0.06-0.2	0.11-0.16	7.4-8.4	<2	High------	0.15			
	19-33	25-35	1.20-1.30	0.2-0.6	0.11-0.19	7.4-8.4	<2	Moderate	0.28			
	33-37	---	---	---	---	---	---	----------	----			
Hackroy---------	0-3	15-25	1.20-1.30	0.6-2.0	0.12-0.14	6.6-7.8	<2	Low-------	0.20	1	6	1-2
	3-14	35-50	1.40-1.50	0.06-0.2	0.15-0.20	6.6-7.8	<2	High------	0.32			
	14-18	---	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
291--------------- Paguate	0-5	27-35	1.25-1.35	0.2-0.6	0.12-0.17	6.6-7.8	<2	Moderate	0.32	2	8	1-2
	5-26	40-50	1.35-1.45	0.06-0.2	0.11-0.16	7.4-8.4	<2	High------	0.15			
	26-38	25-35	1.20-1.30	0.2-0.6	0.11-0.19	7.4-8.4	<2	Moderate	0.28			
	38-42	---	---	---	---	---	---	----------	----			
294*:												
Parkay----------	0-2	18-27	1.35-1.40	0.6-2.0	0.12-0.14	7.4-7.8	<2	Low-------	0.20	5	7	2-3
	2-23	20-35	1.50-1.55	0.6-2.0	0.07-0.09	6.1-7.3	<2	Low-------	0.10			
	23-60	20-35	1.50-1.55	0.6-2.0	0.06-0.08	6.1-7.3	<2	Low-------	0.10			
Rock outcrop.												
300-------------- Saladon	0-4	30-40	1.00-1.05	0.2-0.6	0.19-0.21	6.1-7.3	<2	Moderate	0.32	5	4	5-10
	4-60	35-50	1.35-1.45	<0.06	0.15-0.17	6.1-7.3	<2	High------	0.32			
310-------------- Mirabal	0-3	10-18	1.40-1.50	0.6-2.0	0.09-0.10	6.1-6.5	<2	Low-------	0.10	2	7	1-2
	3-14	10-18	1.40-1.50	0.6-2.0	0.09-0.10	6.1-6.5	<2	Low-------	0.10			
	14-21	20-25	1.25-1.35	0.6-2.0	0.07-0.09	6.1-6.5	<2	Low-------	0.10			
	21-25	---	---	---	---	---	---	----------	----			
315*:												
Abersito, cobbly	0-3	21-30	1.15-1.25	0.6-2.0	0.07-0.08	6.1-6.5	<2	Low-------	0.10	2	7	1-2
	3-9	10-19	1.40-1.50	2.0-6.0	0.07-0.08	6.1-6.5	<2	Low-------	0.10			
	9-24	40-55	1.40-1.50	0.06-0.2	0.07-0.08	6.1-6.5	<2	High------	0.05			
	24-28	---	---	---	---	---	---	----------	----			
Abersito--------	0-5	18-26	1.15-1.25	0.6-2.0	0.12-0.14	6.1-6.5	<2	Low-------	0.20	2	7	1-2
	5-24	40-55	1.40-1.50	0.06-0.2	0.07-0.08	6.1-6.5	<2	High------	0.05			
	24-28	---	---	---	---	---	---	----------	----			
Rock outcrop.												
320-------------- Cinnadale	0-4	10-15	1.35-1.45	2.0-6.0	0.12-0.14	6.6-7.3	<2	Low-------	0.28	1	4	1-2
	4-12	10-15	1.40-1.50	2.0-6.0	0.08-0.10	6.6-7.3	<2	Low-------	0.10			
	12-16	---	---	---	---	---	---	----------	----			
325-------------- Moreno Variant	0-7	10-15	1.35-1.45	0.6-2.0	0.16-0.18	6.1-7.3	<2	Low-------	0.37	5	5	1-2
	7-22	10-15	1.50-1.60	0.6-2.0	0.15-0.17	6.6-7.3	<2	Low-------	0.55			
	22-60	25-35	1.45-1.55	0.2-0.6	0.14-0.21	6.6-7.3	<2	Moderate	0.32			
330-------------- Moreno	0-14	18-27	1.15-1.25	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low-------	0.37	5	6	1-2
	14-35	35-50	1.40-1.50	0.06-0.2	0.16-0.20	6.6-7.8	<2	High------	0.32			
	35-60	30-40	1.40-1.50	0.2-0.6	0.11-0.13	6.6-7.8	<2	Moderate	0.10			
340-------------- Yankee	0-3	30-35	1.40-1.50	0.2-0.6	0.19-0.21	6.6-7.3	<2	Moderate	0.37	5	6	1-2
	3-60	40-55	1.30-1.40	0.06-0.2	0.14-0.16	6.6-8.4	<2	High------	0.24			
350*:												
Rock outcrop.												
Stout-----------	0-3	10-18	1.50-1.55	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low-------	0.24	1	3	.5-.9
	3-14	10-18	1.50-1.55	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low-------	0.24			
	14-18	---	---	---	---	---	---	----------	----			
406*:												
Poley-----------	0-3	15-25	1.25-1.30	0.6-2.0	0.09-0.10	6.6-7.3	<2	Low-------	0.10	5	6	.5-.9
	3-60	30-55	1.40-1.45	0.06-0.2	0.14-0.16	7.4-9.0	<2	High------	0.28			
Rock outcrop.												

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea-bility	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodi-bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
407*:												
Viuda----------	0-3	30-40	1.45-1.50	0.2-0.6	0.09-0.11	7.4-7.8	<2	Moderate	0.10	1	8	.5-.9
	3-13	35-50	1.40-1.45	0.06-0.2	0.14-0.17	7.9-8.4	<2	High------	0.20			
	13-17	---	---	---	---	---	---	----------	----			
Rock outcrop.												
419-------------- Navajo	0-3	30-39	1.40-1.45	0.2-0.6	0.14-0.18	7.4-7.8	4-8	Moderate	0.37	5	4L	.5-.9
	3-60	35-55	1.35-1.40	<0.06	0.11-0.15	7.4-8.4	4-8	High------	0.20			
420*:												
Navajo----------	0-4	30-39	1.40-1.45	0.2-0.6	0.14-0.18	7.4-7.8	4-8	Moderate	0.32	5	4L	.5-.9
	4-60	35-55	1.35-1.40	<0.06	0.11-0.15	7.4-8.4	4-8	High------	0.20			
Suwanee---------	0-3	28-35	1.20-1.30	0.2-0.6	0.19-0.21	7.4-7.8	2-4	Moderate	0.37	5	4L	.5-.9
	3-60	18-35	1.20-1.30	0.2-0.6	0.12-0.14	7.4-9.0	2-4	Moderate	0.24			
424*:												
Mespun----------	0-2	3-8	1.35-1.45	>20	0.05-0.07	6.1-7.8	<2	Low-------	0.17	5	1	.5-.7
	2-60	3-10	1.35-1.45	6.0-20	0.05-0.09	6.1-7.8	<2	Low-------	0.17			
Palma-----------	0-4	5-10	1.70-1.75	6.0-20.	0.06-0.11	6.6-8.4	<2	Low-------	0.20	5	2	1-2
	4-60	10-20	1.65-1.70	2.0-6.0	0.13-0.17	7.4-8.4	<2	Low-------	0.28			
426*:												
Sheppard--------	0-4	5-10	1.45-1.60	6.0-20	0.06-0.08	7.4-8.4	<2	Low-------	0.15	5	2	<.5
	4-60	5-10	1.45-1.60	6.0-20	0.06-0.08	7.4-8.4	<2	Low-------	0.15			
Shiprock--------	0-3	10-20	1.45-1.55	2.0-6.0	0.09-0.12	7.4-8.4	<2	Low-------	0.28	5	3	.5-.6
	3-60	10-18	1.45-1.55	2.0-6.0	0.09-0.12	7.4-9.0	<4	Low-------	0.28			
432*:												
Winona----------	0-3	15-25	1.20-1.30	0.6-2.0	0.09-0.10	7.4-7.8	<2	Low-------	0.10	1	6	1-2
	3-10	15-30	1.20-1.30	0.6-2.0	0.09-0.10	7.4-8.4	<2	Low-------	0.10			
	10-14	---	---	---	---	---	---	----------	----			
Rock outcrop.												
434*:												
Rizozo----------	0-2	10-20	1.40-1.50	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low-------	0.24	1	3	.5-1
	2-10	15-24	1.35-1.45	2.0-6.0	0.11-0.15	7.4-8.4	<2	Low-------	0.24			
	10-14	---	---	---	---	---	---	----------	----			
Rock outcrop.												
446*:												
Harvey----------	0-2	15-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low-------	0.37	5	4L	1-2
	2-60	18-35	1.40-1.50	0.6-2.0	0.14-0.18	7.9-8.4	<2	Moderate	0.37			
Oelop-----------	0-3	18-27	1.20-1.30	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low-------	0.37	5	6	1-2
	3-60	18-35	1.45-1.55	0.2-0.6	0.17-0.20	7.4-8.4	2-4	Moderate	0.37			
476-------------- Saido	0-2	10-20	1.50-1.60	0.6-2.0	0.16-0.18	7.4-8.4	2-4	Low-------	0.37	5	4L	.2-.6
	2-60	---	---	---	---	---	---	----------	----			
485*:												
Rock outcrop.												
Mion------------	0-3	15-25	1.20-1.30	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low-------	0.20	1	8	2-4
	3-13	35-55	1.35-1.45	<0.06	0.15-0.21	7.4-8.4	<2	High------	0.17			
	13-17	---	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
487*:												
Mion------------	0-1	20-27	1.30-1.40	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low--------	0.37	1	4L	1-3
	1-16	38-55	1.35-1.45	<0.06	0.15-0.17	7.4-8.4	<2	High-------	0.32			
	16-20	---	---	---	---	---	---	-----------	----			
Badland.												
500*:												
Timhus----------	0-5	18-25	1.50-1.55	0.6-2.0	0.05-0.06	6.6-7.3	<2	Low--------	0.05	3	8	1-2
	5-20	18-25	1.50-1.55	0.6-2.0	0.08-0.09	7.4-8.4	<2	Low--------	0.10			
	20-29	18-25	1.50-1.55	0.6-2.0	0.05-0.06	7.9-8.4	<2	Low--------	0.05			
	29-60	---	1.00-1.10	6.0-20	0.01-0.03	7.9-8.4	<2	Low--------	0.02			
Bandera---------	0-3	10-15	1.10-1.20	0.6-2.0	0.06-0.12	6.6-8.4	<2	Low--------	0.10	1	7	2-3
	3-16	10-15	1.10-1.20	0.6-2.0	0.06-0.12	6.6-8.4	<2	Low--------	0.10			
	16-60	0-5	1.00-1.10	>20	0.01-0.03	6.6-8.4	<2	Low--------	0.02			
505*:												
Flugle----------	0-5	5-10	1.45-1.55	6.0-20	0.09-0.10	6.6-7.3	<2	Low--------	0.20	5	2	1-3
	5-41	20-35	1.45-1.55	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate	0.37			
	41-61	10-20	1.45-1.55	0.6-2.0	0.11-0.13	7.4-8.4	<2	Low--------	0.24			
Goesling--------	0-5	5-10	1.45-1.55	6.0-20	0.09-0.10	6.6-7.8	<2	Low--------	0.20	5	2	1-3
	5-18	18-35	1.45-1.55	0.2-0.6	0.17-0.19	6.6-8.4	<2	Moderate	0.32			
	18-60	16-30	1.40-1.50	0.2-0.6	0.13-0.15	7.4-8.4	<2	Low--------	0.28			
514*:												
Raton-----------	0-5	20-27	1.20-1.30	0.2-0.6	0.06-0.12	6.6-7.3	<2	Low--------	0.20	1	8	2-4
	5-13	40-55	1.35-1.45	0.06-0.2	0.05-0.10	6.6-7.3	<2	High-------	0.05			
	13-17	---	---	---	---	---	---	-----------	----			
Rock outcrop.												
515*:												
Rock outcrop.												
Vessilla--------	0-3	10-20	1.45-1.55	2.0-6.0	0.11-0.13	6.6-8.4	<2	Low--------	0.24	1	3	.6-.9
	3-15	8-18	1.50-1.60	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low--------	0.28			
	15-19	---	---	---	---	---	---	-----------	----			
Mion------------	0-2	20-27	1.30-1.40	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low--------	0.37	1	4L	1-3
	2-11	38-55	1.35-1.45	<0.06	0.15-0.17	7.4-8.4	<2	High-------	0.32			
	11-15	---	---	---	---	---	---	-----------	----			
518*:												
Borrego---------	0-3	20-35	1.20-1.30	0.2-0.6	0.13-0.15	6.1-7.3	<2	Moderate	0.37	1	6	2-4
	3-11	35-45	1.40-1.50	<0.06	0.10-0.12	5.6-7.8	<2	High-------	0.20			
	11-15	---	---	---	---	---	---	-----------	----			
Charo-----------	0-2	20-27	1.30-1.40	0.6-2.0	0.16-0.18	6.6-7.3	<2	Low--------	0.37	2	6	1-2
	2-27	35-60	1.35-1.45	0.06-0.2	0.15-0.18	6.6-7.8	<2	Moderate	0.28			
	27-31	---	---	---	---	---	---	-----------	----			
Rock outcrop.												
520*:												
Celacy----------	0-2	15-18	1.35-1.45	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low--------	0.24	2	3	1-3
	2-24	18-35	1.45-1.55	0.6-2.0	0.16-0.18	7.4-7.8	<2	Moderate	0.37			
	24-28	---	---	---	---	---	---	-----------	----			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
520*:												
Atarque---------	0-2	10-18	1.40-1.50	2.0-6.0	0.13-0.15	6.6-7.3	<2	Low--------	0.28	1	3	.5-.9
	2-16	24-35	1.40-1.50	0.6-2.0	0.14-0.16	6.6-7.8	<2	Moderate	0.32			
	16-20	---	---	---	---	---	---	----------	----			
522*:												
Bandera, 30 to 45 percent slopes---------	0-8	10-15	1.10-1.20	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low--------	0.20	1	6	2-3
	8-18	10-15	1.10-1.20	0.6-2.0	0.06-0.12	6.6-8.4	<2	Low--------	0.10			
	18-60	0-5	1.00-1.10	>20	0.01-0.03	6.6-8.4	<2	Low--------	0.02			
Bandera, 15 to 30 percent slopes---------	0-9	10-15	1.10-1.20	0.6-2.0	0.10-0.15	6.6-8.4	<2	Low--------	0.20	1	6	2-3
	9-16	10-15	1.10-1.20	0.6-2.0	0.06-0.12	6.6-8.4	<2	Low--------	0.10			
	16-60	0-5	1.00-1.10	>20	0.01-0.03	6.6-8.4	<2	Low--------	0.02			
523*:												
Charo-----------	0-2	20-27	1.30-1.40	0.6-2.0	0.13-0.15	6.6-7.3	<2	Low--------	0.20	2	7	1-2
	2-28	35-60	1.35-1.45	0.06-0.2	0.15-0.18	6.6-7.8	<2	Moderate	0.28			
	28-32	---	---	---	---	---	---	----------	----			
Raton-----------	0-7	20-27	1.20-1.30	0.2-0.6	0.10-0.12	6.6-7.3	<2	Low--------	0.20	1	8	2-4
	7-18	35-55	1.35-1.45	0.06-0.2	0.08-0.09	6.6-7.3	<2	High------	0.10			
	18-22	---	---	---	---	---	---	----------	----			
525*:												
Catman----------	0-3	25-40	1.40-1.50	0.2-0.6	0.14-0.20	6.6-7.8	2-8	Moderate	0.32	5	4L	.5-.9
	3-60	60-75	1.15-1.25	<0.06	0.13-0.15	6.6-8.4	2-8	High------	0.20			
Silkie----------	0-4	30-40	1.35-1.45	0.06-0.2	0.19-0.21	7.4-7.8	<2	Moderate	0.32	5	6	.5-.9
	4-60	35-55	1.35-1.45	<0.06	0.16-0.18	6.6-7.8	<2	High------	0.24			
535-------------- Millpaw	0-3	18-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-7.8	<2	Low--------	0.37	5	6	2-3
	3-29	35-50	1.40-1.50	0.06-0.2	0.17-0.19	7.4-7.8	<2	High------	0.32			
	29-60	18-35	1.40-1.50	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.37			
536-------------- McGaffey	0-3	20-27	1.25-1.35	0.6-2.0	0.17-0.19	6.6-8.4	<2	Low--------	0.43	5	6	2-3
	3-60	20-30	1.40-1.50	0.6-2.0	0.17-0.19	6.6-8.4	<2	Low--------	0.37			
537*:												
Millpaw---------	0-2	18-25	1.15-1.25	0.6-2.0	0.16-0.18	7.4-7.8	<2	Low--------	0.37	5	6	2-3
	2-37	35-50	1.40-1.50	0.06-0.2	0.17-0.19	7.4-7.8	<2	High------	0.32			
	37-60	18-35	1.40-1.50	0.6-2.0	0.16-0.18	7.4-8.4	<2	Moderate	0.37			
Loarc-----------	0-4	10-15	1.35-1.45	2.0-6.0	0.13-0.15	6.6-7.3	<2	Low--------	0.28	5	3	1-3
	4-60	18-35	1.40-1.50	0.6-2.0	0.14-0.16	6.6-8.4	<2	Moderate	0.32			
540-------------- Montecito	0-5	10-20	1.40-1.50	2.0-6.0	0.11-0.13	6.6-7.8	<2	Low--------	0.28	5	3	.5-.9
	5-30	35-50	1.35-1.45	0.2-0.6	0.15-0.17	6.6-8.4	<2	High------	0.32			
	30-60	35-50	1.35-1.45	0.2-0.6	0.12-0.14	7.4-8.4	<2	High------	0.15			
550*:												
Nogal-----------	0-1	10-18	1.45-1.55	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low--------	0.24	2	3	1-2
	1-31	35-60	1.30-1.40	0.06-0.2	0.11-0.17	6.6-8.4	<2	High------	0.24			
	31-35	---	---	---	---	---	---	----------	----			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
550*:												
Galestina-------	0-2	10-19	1.45-1.55	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low-------	0.24	3	3	.5-.9
	2-7	15-30	1.25-1.35	0.6-2.0	0.16-0.18	6.6-7.8	<2	Moderate	0.37			
	7-46	35-60	1.35-1.50	0.06-0.2	0.16-0.18	6.6-7.8	<2	High------	0.28			
	46-60	---	---	---	---	---	---	----------	----			
555*:												
Pinitos---------	0-2	10-18	1.45-1.55	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low-------	0.24	5	3	.5-.9
	2-24	20-35	1.40-1.50	0.6-2.0	0.17-0.19	6.6-7.8	<2	Moderate	0.32			
	24-60	15-25	1.40-1.50	2.0-6.0	0.13-0.15	7.4-7.8	<2	Low-------	0.28			
Ribera----------	0-3	12-18	1.30-1.40	0.6-2.0	0.13-0.16	6.6-7.8	<2	Low-------	0.28	2	3	.5-1
	3-39	20-30	1.20-1.30	0.6-2.0	0.16-0.19	6.6-8.4	<2	Low-------	0.32			
	39-43	---	---	---	---	---	---	----------	----			
560*:												
Flugle----------	0-5	5-10	1.45-1.55	6.0-20	0.09-0.10	6.6-7.3	<2	Low-------	0.20	5	2	1-3
	5-37	20-35	1.45-1.55	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate	0.37			
	37-60	10-20	1.45-1.55	0.6-2.0	0.11-0.13	7.4-8.4	<2	Low-------	0.24			
Teco------------	0-2	10-20	1.35-1.45	2.0-6.0	0.12-0.14	6.6-7.3	<2	Low-------	0.24	5	3	1-2
	2-18	35-45	1.45-1.55	0.2-0.6	0.15-0.18	7.4-8.4	<2	High------	0.37			
	18-60	15-30	1.45-1.55	2.0-6.0	0.15-0.17	7.9-8.4	<2	Low-------	0.28			
561*:												
Flugle----------	0-2	10-17	1.35-1.45	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low-------	0.24	5	3	1-3
	2-47	20-35	1.45-1.55	0.6-2.0	0.16-0.18	6.6-8.4	<2	Moderate	0.37			
	47-60	10-20	1.45-1.55	0.6-2.0	0.11-0.13	7.4-8.4	<2	Low-------	0.24			
Quintana--------	0-11	10-20	1.40-1.45	2.0-6.0	0.13-0.15	7.4-7.8	<2	Low-------	0.28	5	3	.5-.9
	11-46	20-35	1.35-1.40	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate	0.32			
	46-60	10-20	1.40-1.45	2.0-6.0	0.11-0.13	7.9-8.4	<2	Low-------	0.24			
565-------------- Quintana	0-4	10-20	1.40-1.45	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low-------	0.24	5	3	.5-.9
	4-21	20-35	1.35-1.40	0.6-2.0	0.14-0.16	7.9-8.4	<2	Moderate	0.32			
	21-60	10-20	1.40-1.45	2.0-6.0	0.11-0.13	7.9-8.4	<2	Low-------	0.24			
570*:												
Torreon---------	0-2	15-25	1.10-1.15	0.6-2.0	0.08-0.09	6.6-7.3	<2	Low-------	0.10	5	8	1-3
	2-25	35-50	1.25-1.30	0.06-0.2	0.14-0.16	6.6-7.8	<2	High------	0.24			
	25-60	30-40	1.25-1.30	0.2-0.6	0.19-0.21	7.4-9.0	<2	Moderate	0.37			
Rock outcrop.												
Cabezon---------	0-3	18-27	1.25-1.40	0.6-2.0	0.09-0.11	6.1-7.8	<2	Low-------	0.10	1	8	1-2
	3-13	35-60	1.35-1.45	0.06-0.2	0.14-0.17	6.1-7.8	<2	High------	0.24			
	13-17	---	---	---	---	---	---	----------	----			
575*:												
Teco------------	0-6	10-20	1.35-1.45	2.0-6.0	0.12-0.14	6.6-7.3	<2	Low-------	0.24	5	3	1-2
	6-24	35-45	1.45-1.55	0.2-0.6	0.15-0.18	7.4-8.4	<2	High------	0.37			
	24-60	15-30	1.45-1.55	2.0-6.0	0.15-0.17	7.9-8.4	<2	Low-------	0.28			
Atarque---------	0-3	10-18	1.40-1.50	2.0-6.0	0.13-0.15	6.6-7.3	<2	Low-------	0.28	1	3	.5-.9
	3-19	24-35	1.40-1.50	0.6-2.0	0.14-0.16	6.6-7.8	<2	Moderate	0.32			
	19-23	---	---	---	---	---	---	----------	----			
576-------------- Teco	0-3	10-20	1.35-1.45	2.0-6.0	0.12-0.14	6.6-7.3	<2	Low-------	0.24	5	3	1-2
	3-60	35-45	1.45-1.55	0.2-0.6	0.15-0.18	7.4-8.4	<2	High------	0.37			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
577*:												
Cabezon---------	0-2	18-27	1.25-1.40	0.6-2.0	0.09-0.11	6.1-7.8	<2	Low-------	0.10	1	8	1-2
	2-18	35-60	1.35-1.45	0.06-0.2	0.14-0.17	6.1-7.8	<2	High------	0.24			
	18-22	---	---	---	---	---	---	----------	----			
Montecito-------	0-3	27-30	1.35-1.45	0.6-2.0	0.19-0.21	6.6-7.8	<2	Low-------	0.32	5	6	.5-.9
	3-24	35-40	1.45-1.55	0.2-0.6	0.19-0.21	6.6-8.4	<2	Moderate	0.32			
	24-60	35-40	1.45-1.55	0.2-0.6	0.15-0.17	7.4-8.4	<2	Moderate	0.32			
Rock outcrop.												
579*:												
Cabezon---------	0-2	10-20	1.25-1.40	2.0-6.0	0.06-0.08	6.1-7.8	<2	Low-------	0.10	1	8	1-2
	2-14	35-60	1.35-1.45	0.06-0.2	0.14-0.17	6.1-7.8	<2	High------	0.24			
	14-18	---	---	---	---	---	---	----------	----			
Cantina---------	0-2	15-20	1.45-1.55	2.0-6.0	0.11-0.13	6.6-7.3	<2	Low-------	0.24	3	3	1-2
	2-9	20-35	1.35-1.45	0.6-2.0	0.14-0.16	6.6-7.3	<2	Moderate	0.32			
	9-31	35-55	1.35-1.45	0.06-0.2	0.15-0.17	7.4-8.4	<2	High------	0.28			
	31-54	25-40	1.40-1.50	0.6-2.0	0.15-0.17	7.9-8.4	<2	Moderate	0.32			
	54-58	---	---	---	---	---	---	----------	----			
581*:												
Laporte---------	0-1	12-20	1.35-1.40	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low-------	0.20	1	5	1-2
	1-18	15-27	1.35-1.40	0.6-2.0	0.11-0.14	7.4-8.4	<2	Low-------	0.20			
	18-22	---	---	0.00-0.2	---	---	---	----------	----			
Vessilla--------	0-6	10-20	1.45-1.55	2.0-6.0	0.11-0.13	6.6-8.4	<2	Low-------	0.24	1	3	.6-.9
	6-18	8-18	1.50-1.60	2.0-6.0	0.13-0.15	7.4-8.4	<2	Low-------	0.28			
	18-22	---	---	---	---	---	---	----------	----			
582--------------	0-15	5-10	1.40-1.50	6.0-20	0.05-0.07	6.6-7.3	<2	Low-------	0.17	5	1	.5-.9
Kenray	15-60	5-12	1.55-1.65	6.0-20	0.06-0.08	6.6-7.3	<2	Low-------	0.17			
585--------------	0-2	20-27	1.15-1.25	0.6-2.0	0.19-0.21	7.9-8.4	<2	Low-------	0.43	5	4L	.6-.9
Moncha	2-21	25-35	1.35-1.45	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	0.37			
	21-60	23-33	1.35-1.45	0.2-0.6	0.19-0.21	7.4-8.4	<2	Moderate	0.43			
586*:												
Venadito--------	0-3	30-39	1.40-1.50	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	0.32	5	4L	<1
	3-60	60-80	1.15-1.25	<0.06	0.14-0.16	7.9-8.4	2-4	High------	0.20			
Teco------------	0-3	27-35	1.40-1.50	0.2-0.6	0.19-0.21	6.6-7.3	<2	Moderate	0.32	5	6	1-2
	3-60	35-45	1.45-1.55	0.2-0.6	0.15-0.18	7.4-8.4	<2	High------	0.37			
591*:												
Valnor----------	0-2	20-35	1.35-1.45	0.2-0.6	0.19-0.21	6.6-7.3	<2	Moderate	0.32	2	6	2-4
	2-38	35-45	1.55-1.65	0.06-0.2	0.14-0.16	6.6-8.4	<2	High------	0.32			
	38-42	---	---	---	---	---	---	----------	----			
Techado---------	0-3	29-39	1.40-1.50	0.2-0.6	0.14-0.16	6.6-7.3	<2	Moderate	0.15	1	7	.5-.9
	3-16	40-55	1.40-1.50	0.06-0.2	0.13-0.15	6.6-7.3	<2	High------	0.20			
	16-20	---	---	---	---	---	---	----------	----			
610*:												
Grieta----------	0-8	10-20	1.45-1.55	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low-------	0.24	5	3	.2-.5
	8-28	18-35	1.45-1.55	0.6-2.0	0.13-0.19	7.4-8.4	2-4	Low-------	0.32			
	28-60	5-20	1.55-1.65	2.0-6.0	0.08-0.10	7.4-8.4	2-4	Low-------	0.20			

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors		Wind erodi- bility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
610*:												
Shiprock--------	0-3	10-20	1.45-1.55	2.0-6.0	0.09-0.12	7.4-8.4	<2	Low--------	0.28	5	3	.5-.6
	3-60	10-18	1.45-1.55	2.0-6.0	0.09-0.12	7.4-9.0	<4	Low--------	0.28			
611*:												
Grieta----------	0-3	10-20	1.45-1.55	2.0-6.0	0.11-0.13	7.4-8.4	<2	Low--------	0.24	5	3	.2-.5
	3-60	18-35	1.45-1.55	0.6-2.0	0.13-0.19	7.4-8.4	2-4	Low--------	0.32			
Kiki------------	0-6	13-19	1.45-1.55	2.0-6.0	0.11-0.13	7.4-7.8	<2	Low--------	0.24	2	3	.3-.6
	6-14	28-35	1.45-1.55	0.6-2.0	0.17-0.19	7.4-7.8	<2	Moderate	0.32			
	14-24	21-32	1.45-1.55	0.6-2.0	0.14-0.16	7.4-7.8	<2	Moderate	0.32			
	24-28	---	---	---	---	---	---	-----------	----			
615*:												
Trag------------	0-2	15-20	1.10-1.20	0.6-2.0	0.12-0.14	6.1-7.3	<2	Low--------	0.15	5	5	2-4
	2-35	18-35	1.25-1.35	0.6-2.0	0.14-0.18	6.1-7.3	<2	Low--------	0.28			
	35-60	10-20	1.35-1.45	2.0-6.0	0.10-0.12	6.1-7.8	<2	Low--------	0.20			
Techado---------	0-2	30-40	1.40-1.50	0.2-0.6	0.12-0.17	6.6-7.3	<2	Moderate	0.15	1	8	.5-.9
	2-19	35-50	1.40-1.50	0.06-0.2	0.15-0.21	6.6-7.3	<2	High-------	0.32			
	19-38	---	---	---	---	---	---	-----------	----			
	38-42	---	---	---	---	---	---	-----------	----			
Rock outcrop.												
618-------------- Netoma	0-12	10-18	1.55-1.65	2.0-6.0	0.11-0.13	7.4-8.4	4-8	Low--------	0.24	5	3	.3-.5
	12-60	---	---	---	---	---	---	-----------	----			
619-------------- Venadito	0-4	30-39	1.40-1.50	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	0.32	5	4L	<1
	4-60	60-80	1.15-1.25	<0.06	0.14-0.16	7.9-8.4	2-4	High-------	0.20			
620*:												
Aparejo---------	0-2	18-25	1.20-1.30	0.6-2.0	0.19-0.21	7.9-8.4	2-4	Low--------	0.43	5	4L	.5-.9
	2-18	18-35	1.20-1.30	0.2-0.6	0.19-0.21	7.9-8.4	2-4	Moderate	0.37			
	18-60	18-30	1.20-1.30	0.6-2.0	0.14-0.21	7.9-8.4	2-4	Low--------	0.32			
Venadito--------	0-3	30-39	1.40-1.50	0.2-0.6	0.19-0.21	7.9-8.4	<2	Moderate	0.37	5	4L	<1
	3-60	60-80	1.15-1.25	<0.06	0.14-0.16	7.9-8.4	2-4	High-------	0.20			
625*:												
Hagerman--------	0-6	10-20	1.45-1.55	2.0-6.0	0.13-0.15	6.6-7.8	<2	Low--------	0.28	2	3	.8-.9
	6-34	18-35	1.40-1.50	0.6-2.0	0.15-0.17	6.6-8.4	<2	Moderate	0.32			
	34-38	---	---	---	---	---	---	-----------	----			
Bond------------	0-5	8-17	1.45-1.55	0.6-2.0	0.12-0.14	6.6-7.8	<2	Low--------	0.28	1	3	.8-1
	5-18	20-35	1.45-1.55	0.2-0.6	0.11-0.13	6.6-8.4	<2	Moderate	0.28			
	18-22	---	---	---	---	---	---	-----------	----			
630*:												
Bond------------	0-2	8-17	1.45-1.55	0.6-2.0	0.12-0.14	6.6-7.8	<2	Low--------	0.28	1	3	.8-1
	2-19	20-35	1.45-1.55	0.2-0.6	0.11-0.13	6.6-8.4	<2	Moderate	0.28			
	19-23	---	---	---	---	---	---	-----------	----			
Rizozo----------	0-2	18-27	1.25-1.35	0.6-2.0	0.15-0.17	7.4-8.4	<2	Low--------	0.43	1	4L	<1
	2-14	18-27	1.30-1.40	0.6-2.0	0.13-0.16	7.4-8.4	<2	Low--------	0.32			
	14-18	---	---	---	---	---	---	-----------	----			
Rock outcrop.												

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permea- bility	Available water capacity	Soil reaction	Salinity	Shrink- swell potential	Erosion factors K	Erosion factors T	Wind erodi- bility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
640*:												
Flaco-----------	0-2	13-26	1.50-1.60	0.6-2.0	0.13-0.15	7.9-8.4	<2	Low--------	0.37	2	4L	1-2
	2-11	18-35	1.55-1.65	0.2-0.6	0.17-0.19	7.9-8.4	<2	Moderate	0.37			
	11-29	18-30	1.55-1.65	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low--------	0.32			
	29-33	---	---	---	---	---	---	-----------	----			
Berto-----------	0-2	12-20	1.35-1.45	0.6-2.0	0.15-0.17	7.4-7.8	<2	Low--------	0.37	1	4L	1-2
	2-11	18-30	1.40-1.50	0.6-2.0	0.17-0.19	7.9-8.4	<2	Low--------	0.37			
	11-18	18-30	1.40-1.50	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low--------	0.20			
	18-22	---	---	---	---	---	---	-----------	----			
641*:												
Berto-----------	0-2	8-20	1.35-1.45	0.6-2.0	0.13-0.15	7.9-8.4	<2	Low--------	0.20	1	4L	1-2
	2-8	18-30	1.40-1.50	0.6-2.0	0.17-0.19	7.9-8.4	<2	Low--------	0.37			
	8-16	18-30	1.40-1.50	0.6-2.0	0.16-0.18	7.9-8.4	<2	Low--------	0.20			
	16-20	---	---	---	---	---	---	-----------	----			
Flaco-----------	0-2	13-26	1.15-1.25	0.6-2.0	0.12-0.14	7.9-8.4	<2	Low--------	0.20	2	8	1-2
	2-9	18-35	1.20-1.30	0.2-0.6	0.17-0.19	7.9-8.4	<2	Moderate	0.37			
	9-26	18-30	1.40-1.50	0.6-2.0	0.15-0.17	7.9-8.4	<2	Low--------	0.32			
	26-30	---	---	---	---	---	---	-----------	----			
645*:												
Penistaja-------	0-3	10-20	1.35-1.45	0.6-2.0	0.13-0.15	6.6-8.4	<2	Low--------	0.28	5	3	.8-2
	3-18	20-30	1.40-1.50	0.6-2.0	0.15-0.18	6.6-8.4	<2	Low--------	0.32			
	18-60	15-25	1.20-1.30	2.0-6.0	0.12-0.15	6.6-8.4	<2	Low--------	0.28			
Oelop-----------	0-3	18-27	1.20-1.30	0.6-2.0	0.16-0.18	7.4-8.4	<2	Low--------	0.37	5	6	1-2
	3-60	18-35	1.45-1.55	0.2-0.6	0.17-0.20	7.4-8.4	2-4	Moderate	0.37			
650*:												
Winona----------	0-3	15-25	1.20-1.30	0.6-2.0	0.09-0.10	7.4-7.8	<2	Low--------	0.10	1	6	1-2
	3-15	15-30	1.20-1.30	0.6-2.0	0.09-0.10	7.4-8.4	<2	Low--------	0.10			
	15-19	---	---	---	---	---	---	-----------	----			
Tanbark---------	0-2	18-27	1.40-1.50	0.6-2.0	0.13-0.16	7.4-9.0	4-8	Low--------	0.43	1	4L	.3-.5
	2-17	---	---	---	---	---	---	-----------	----			
	17-21	---	---	---	---	---	---	-----------	----			
Rock outcrop.												
660*:												
Rana------------	0-3	60-70	1.15-1.25	<0.06	0.08-0.10	7.9-8.4	<2	High-------	0.05	5	5	.5-.9
	3-34	65-85	1.15-1.25	<0.06	0.14-0.16	7.9-9.0	2-4	High-------	0.20			
	34-60	65-85	1.15-1.25	<0.06	0.14-0.16	8.5-9.0	2-4	High-------	0.20			
Rock outcrop.												

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
10*. Lava flows												
20. Penistaja	B	None	---	---	>6.0	---	---	>60	---	---	High	Low.
21. Clovis	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
25*:												
Hickman	B	Occasional	Very brief	Jun-Aug	>6.0	---	---	>60	---	Low	High	Low.
Catman	D	Occasional	Long	Jul-Sep	>6.0	---	---	>60	---	Low	High	Moderate.
30. Warm Springs	C	Frequent	Brief	Jul-Oct	1.0-2.5	Apparent	Apr-Sep	>60	---	High	High	Moderate.
40, 41, 45. Aparejo	B	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Moderate	High	Low.
50, 51. Venadito	D	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	Low	High	Low.
52. Venadito Variant	D	Occasional	Very brief	Jul-Sep	>6.0	---	---	20-40	Hard	Low	High	Low.
55*:												
Glenberg	B	Occasional	Very brief	Jul-Oct	>6.0	---	---	>60	---	Low	High	Low.
San Mateo	B	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	Low	High	Low.
56. Mespun	A	None	---	---	>6.0	---	---	>60	---	Low	Moderate	Low.
57, 58. San Mateo	B	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	Low	High	Low.
60. Sparank	D	Occasional	Brief	Jul-Oct	>6.0	---	---	>60	---	Low	High	Low.
61. Sparham	D	Occasional	Brief	Jun-Aug	3.0-4.0	Apparent	Apr-Sep	>60	---	Moderate	High	Moderate.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
62: Sparank	D	Occasional	Brief	Jul-Oct	>6.0	---	---	>60	---	Low	High	Low.
66: Zia	B	None	--	---	>6.0	---	---	>60	---	Low	High	Low.
70: Catman	D	Occasional	Long	Jul-Sep	>6.0	---	---	>60	---	Low	High	Moderate.
72: Catman Variant	D	Occasional	Brief	Jun-Sep	2.0-4.0	Apparent	Apr-Sep	>60	---	High	High	Low.
73: Catman	D	Occasional	Long	Jul-Sep	>6.0	---	---	>60	---	Low	High	Moderate.
75: Hickman	B	Occasional	Very brief	Jun-Aug	>6.0	---	---	>60	---	Low	High	Low.
100: Manzano	B	Occasional	Very brief	May-Oct	>6.0	---	---	>60	---	Moderate	High	Low.
120*:												
Rock outcrop.												
Laporte	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
130*:												
Laporte	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
Rock outcrop.												
200: Penistaja	B	None	---	---	>6.0	---	---	>60	---	---	High	Low.
205: Ildefonso	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
210*:												
Bond	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
Penistaja	B	None	---	---	>6.0	---	---	>60	---	---	High	Low.
Rock outcrop.												
218*:												
Viuda	D	None	---	--	>6.0	---	---	10-20	Hard	Low	High	Low.
Penistaja	B	None	---	---	>6.0	---	---	>60	---	---	High	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness		Uncoated steel	Concrete
					Ft			In				
218*:												
Rock outcrop.												
230*:												
Dumps.												
Pits.												
251*:												
Skyvillage	D	None	---	---	>6.0	---	---	10-20	Hard	Low	Moderate	Low.
Rock outcrop.												
Bond	D	None	---	---	>6.0	---	---	10-20	Hard	Low	High	Low.
257*:												
Sparank	D	Occasional	Brief	Jul-Oct	>6.0	---	---	>60	---	Low	High	Low.
San Mateo	B	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	Low	High	Low.
259 Mikim	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
262*:												
Poley	C	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
Pojoaque	B	None	---	---	>6.0	---	---	>60	---	Moderate	High	Low.
264 Tapia	B	None	---	---	>6.0	---	---	>60	---	Low	High	Low.
270 Charo	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate	Low.
272*:												
Cebolleta	C	None	---	---	>6.0	---	---	20-40	Hard	Low	Moderate	Low.
Borrego	D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Moderate.
Rock outcrop.												
276 Trag	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
278*:												
Microy	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Moderate	Low.
Rock outcrop.												

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
282------------- Cebolleta	C	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate	Low.
284*:												
Cebolleta------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate	Low.
Rock outcrop.												
286*:												
Cebolleta------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate	Low.
Raton----------	D	None---------	---	---	>6.0	---	---	6-20	Hard	Moderate	Moderate	Low.
290*:												
Paguate--------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	High-----	Low.
Hackroy--------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
291------------- Paguate	C	None---------	- -	---	>6.0	---	---	20-40	Hard	Low------	High-----	Low.
294*:												
Parkay---------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Rock outcrop.												
300------------- Saladon	D	Rare---------	--	---	0-4.0	Apparent	Jun-Sep	>60	---	Moderate	Moderate	Low.
310------------- Mirabal	C	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate	Low.
315*:												
Abersito, cobbly--------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate	Low.
Abersito-------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate	Low.
Rock outcrop.												
320------------- Cinnadale	D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Moderate	Low.
325------------- Moreno Variant	B	None---------	---	--	>6.0	---	---	>60	---	Moderate	Moderate	Low.
330------------- Moreno	C	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness		Uncoated steel	Concrete
					Ft			In				
340------------- Yankee	D	None---------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
350*: Rock outcrop.												
Stout----------	D	None---------	---	---	>6.0	---	---	6-20	Hard	Moderate	Moderate	Low.
406*: Poley----------	D	None---------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
Rock outcrop.												
407*: Viuda----------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Low------	High-----	Low.
Rock outcrop.												
419------------- Navajo	D	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	Low------	High-----	Low.
420*: Navajo---------	D	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	Low------	High-----	Low.
Suwanee--------	B	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Moderate	High-----	Low.
424*: Mespun---------	A	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate	Low.
Palma----------	B	None---------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
426*: Sheppard-------	A	None---------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
Shiprock-------	B	None---------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
432*: Winona---------	D	None---------	---	---	>6.0	---	---	5-20	Hard	Low------	High-----	Low.
Rock outcrop.												
434*: Rizozo---------	D	None---------	---	---	>6.0	---	---	4-20	Hard	Low------	Moderate	Low.
Rock outcrop.												
446*: Harvey---------	B	None---------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro- logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard- ness		Uncoated steel	Concrete
					Ft			In				
446*:												
Oelop----------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
476------------- Saido	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	High.
485*:												
Rock outcrop.												
Mion-----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	High-----	Low.
487*:												
Mion-----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	High-----	Low.
Badland.												
500*:												
Timhus---------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	Moderate	Low.
Bandera--------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
505*:												
Flugle---------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Goesling-------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
514*:												
Raton----------	D	None--------	---	---	>6.0	---	---	6-20	Hard	Moderate	Moderate	Low.
Rock outcrop.												
515*:												
Rock outcrop.												
Vessilla-------	D	None--------	---	---	>6.0	---	---	6-20	Soft	Low------	High-----	Low.
Mion-----------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	High-----	Low.
518*:												
Borrego--------	D	None--------	---	---	>6.0	---	---	14-20	Hard	Moderate	Moderate	Moderate.
Charo----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	Moderate	Low.
Rock outcrop.												
520*:												
Celacy---------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness		Uncoated steel	Concrete
					Ft			In				
520*:												
Atarque----------	D	None----------	---	---	>6.0	---	---	8-20	Hard	Low--------	Moderate	Low.
522*:												
Bandera, 30 to 45 percent slopes----------	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Bandera, 15 to 30 percent slopes----------	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
523*:												
Charo------------	C	None----------	---	---	>6.0	---	---	20-40	Hard	Low--------	Moderate	Low.
Raton------------	D	None----------	---	---	>6.0	---	---	6-20	Hard	Moderate	Moderate	Low.
525*:												
Catman-----------	D	Occasional	Long--------	Jul-Sep	>6.0	---	---	>60	---	Low--------	High------	Moderate.
Silkie-----------	D	None----------	---	---	>6.0	---	---	>60	---	Low--------	High------	Low.
535--------------- Millpaw	C	None----------	---	---	>6.0	---	---	>60	---	Low--------	High------	Low.
536--------------- McGaffey	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
537*:												
Millpaw----------	C	None----------	---	---	>6.0	---	---	>60	---	Low--------	High------	Low.
Loarc------------	B	None----------	---	---	>6.0	---	---	>60	---	Low--------	High------	Low.
540--------------- Montecito	B	None----------	---	---	>6.0	---	---	>60	---	Low--------	High------	Low.
550*:												
Nogal------------	C	None----------	---	---	>6.0	---	---	20-40	Soft	Low--------	High------	Low.
Galestina--------	C	None----------	---	---	>6.0	---	---	40-60	Soft	Low--------	Moderate	Low.
555*:												
Pinitos----------	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Ribera-----------	C	None----------	---	---	>6.0	---	---	20-40	Hard	Moderate	High------	Low.
560*:												
Flugle-----------	B	None----------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
560*:												
Teco------------	B	None---------	---	---	>6.0	---	--	>60	---	Low-------	High------	Low.
561*:												
Flugle----------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.
Quintana--------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
565-------------- Quintana	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
570*:												
Torreon---------	D	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
Rock outcrop.												
Cabezon---------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Low-------	Moderate	Low.
575*:												
Teco------------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
Atarque---------	D	None---------	---	---	>6.0	---	---	8-20	Hard	Low-------	Moderate	Low.
576-------------- Teco	B	None---------	---	--	>6.0	---	---	>60	---	Low-------	High------	Low.
577*:												
Cabezon---------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Low-------	Moderate	Low.
Montecito-------	B	None---------	---	---	>6.0	---	---	>60	---	Low-------	High------	Low.
Rock outcrop.												
579*:												
Cabezon---------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Low-------	Moderate	Low.
Cantina---------	C	None---------	---	---	>6.0	---	---	40-60	Hard	Low-------	High------	Low.
581*:												
Laporte---------	D	None---------	---	---	>6.0	---	---	10-20	Hard	Low-------	High------	Low.
Vessilla--------	D	None---------	---	---	>6.0	---	---	6-20	Soft	Low-------	High------	Low.
582-------------- Kenray	A	None---------	---	---	>6.0	---	---	>60	---	Low-------	Moderate	Low.
585-------------- Moncha	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High------	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness		Uncoated steel	Concrete
					Ft			In				
586*:												
Venadito-------	D	Occasional	Very brief	Jul-Sep	>6.0	--	---	>60	---	Low------	High-----	Low.
Teco-----------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
591*:												
Valnor---------	C	None--------	---	---	>6.0	---	---	20-40	Soft	Low------	High-----	Low.
Techado--------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	Moderate	Low.
610*:												
Grieta---------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Shiprock-------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
611*:												
Grieta---------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Low.
Kiki-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
615*:												
Trag-----------	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
Techado--------	D	None--------	---	---	>6.0	---	---	10-20	Soft	Low------	Moderate	Low.
Rock outcrop.												
618------------- Netoma	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	High.
619------------- Venadito	D	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	Low------	High-----	Low.
620*:												
Aparejo--------	B	Occasional	Very brief	Jun-Sep	>6.0	---	---	>60	---	Moderate	High-----	Low.
Venadito-------	D	Occasional	Very brief	Jul-Sep	>6.0	---	---	>60	---	Low------	High-----	Low.
625*:												
Hagerman-------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Low------	High-----	Low.
Bond-----------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Low------	High-----	Low.
630*:												
Bond-----------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Low------	High-----	Low.
Rizozo---------	D	None--------	---	---	>6.0	---	---	4-20	Hard	Low------	High-----	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
630*:												
Rock outcrop.												
640*:												
Flaco----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
Berto----------	D	None--------	---	---	>6.0	---	---	11-20	Hard	Moderate	High-----	Low.
641*:												
Berto----------	D	None--------	---	---	>6.0	---	---	11-20	Hard	Moderate	High-----	Low.
Flaco----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Low.
645*:												
Penistaja------	B	None--------	---	---	>6.0	---	---	>60	---	---	High-----	Low.
Oelop----------	B	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
650*:												
Winona---------	D	None--------	---	---	>6.0	---	---	5-20	Hard	Low------	High-----	Low.
Tanbark--------	D	None--------	---	---	>6.0	---	---	10-20	Hard	Low------	High-----	High.
Rock outcrop.												
660*:												
Rana-----------	D	None--------	---	---	>6.0	---	---	>60	---	Low------	High-----	Low.
Rock outcrop.												

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Abersito	Clayey-skeletal, mixed Mollic Eutroboralfs
Aparejo	Fine-loamy, mixed (calcareous), mesic Typic Ustifluvents
Atarque	Loamy, mixed, mesic Lithic Haplustalfs
Bandera	Loamy-skeletal over fragmental, mixed Entic Haploborolls
Berto	Loamy, mixed, mesic Lithic Ustollic Haplargids
Bond	Loamy, mixed, mesic Lithic Ustollic Haplargids
*Borrego	Clayey, mixed Lithic Eutroboralfs
Cabezon	Clayey, montmorillonitic, mesic Lithic Argiustolls
Cantina	Fine, mixed, mesic Aridic Argiustolls
Catman	Very fine, montmorillonitic, mesic Udorthentic Chromusterts
Catman Variant	Very fine, montmorillonitic, mesic Mollic Ustifluvents
Cebolleta	Clayey-skeletal, mixed Typic Argiborolls
Celacy	Fine-loamy, mixed, mesic Aridic Haplustalfs
Charo	Fine, mixed Typic Argiborolls
Cinnadale	Loamy-skeletal, mixed, frigid Lithic Ustochrepts
*Clovis	Fine-loamy, mixed, mesic Ustollic Haplargids
Flaco	Fine-loamy, mixed, mesic Ustollic Haplargids
Flugle	Fine-loamy, mixed, mesic Aridic Haplustalfs
Galestina	Fine, mixed, mesic Aridic Paleustalfs
Glenberg	Coarse-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Goesling	Fine-loamy, mixed, mesic Aridic Haplustalfs
Grieta	Fine-loamy, mixed, mesic Typic Haplargids
Hackroy	Clayey, mixed, mesic Lithic Haplustalfs
Hagerman	Fine-loamy, mixed, mesic Ustollic Haplargids
Harvey	Fine-loamy, mixed, mesic Ustollic Calciorthids
Hickman	Fine-loamy, mixed (calcareous), mesic Typic Ustifluvents
*Ildefonso	Loamy-skeletal, mixed, mesic Ustollic Calciorthids
Kenray	Mixed, frigid Typic Ustipsamments
Kiki	Fine-loamy, mixed, mesic Typic Haplargids
Laporte	Loamy, carbonatic, mesic Lithic Haplustolls
Loarc	Fine-loamy, mixed, mesic Aridic Argiustolls
*Manzano	Fine-loamy, mixed, mesic Cumulic Haplustolls
McGaffey	Fine-loamy, mixed Cumulic Haploborolls
Mespun	Mixed, mesic Ustic Torripsamments
Microy	Fine, mixed Typic Argiborolls
Mikim	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents
Millpaw	Fine, mixed, mesic Pachic Argiustolls
Mion	Clayey, mixed (calcareous), mesic, shallow Ustic Torriorthents
Mirabal	Loamy-skeletal, mixed, nonacid, frigid Typic Ustorthents
Moncha	Fine-silty, mixed, mesic Aridic Haplustalfs
Montecito	Fine, mixed, mesic Aridic Haplustalfs
Moreno	Fine, mixed Typic Argiborolls
Moreno Variant	Fine-loamy, mixed Mollic Eutroboralfs
Navajo	Fine, mixed (calcareous), mesic Vertic Torrifluvents
Netoma	Coarse-loamy, gypsic, mesic Typic Gypsiorthids
Nogal	Fine, mixed, mesic Aridic Haplustalfs
Oelop	Fine-loamy, mixed, mesic Ustollic Haplargids
Paguate	Fine, mixed, mesic Aridic Haplustalfs
Palma	Coarse-loamy, mixed, mesic Ustollic Haplargids
Parkay	Loamy-skeletal, mixed Argic Pachic Cryoborolls
Penistaja	Fine-loamy, mixed, mesic Ustollic Haplargids
Pinitos	Fine-loamy, mixed, mesic Aridic Haplustalfs
Pojoaque	Fine-loamy, mixed (calcareous), mesic Ustic Torriorthents
Poley	Fine, mixed, mesic Ustollic Haplargids
*Quintana	Fine-loamy, mixed, mesic Typic Ustochrepts
Rana	Very fine, montmorillonitic (calcareous), mesic Ustertic Torriorthents
Raton	Clayey-skeletal, mixed Lithic Argiborolls
Ribera	Fine-loamy, mixed, mesic Aridic Haplustalfs
*Rizozo	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Saido	Coarse-silty, gypsic, mesic Typic Gypsiorthids

TABLE 15.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
*Saladon	Fine, montmorillonitic Typic Cryaquolls
San Mateo	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Sheppard	Mixed, mesic Typic Torripsamments
Shiprock	Coarse-loamy, mixed, mesic Typic Haplargids
Silkie	Fine, mixed, mesic Vertic Haplustalfs
Skyvillage	Loamy, mixed (calcareous), mesic Lithic Ustic Torriorthents
Sparank	Fine, mixed (calcareous), mesic Ustic Torrifluvents
Sparham	Fine, mixed (calcareous), mesic Typic Ustifluvents
Stout	Loamy, mixed, nonacid, frigid Lithic Ustorthents
Suwanee	Fine-loamy, mixed (calcareous), mesic Ustic Torrifluvents
Tanbark	Loamy, gypsic, mesic, shallow Ustic Torriorthents
Tapia	Fine-loamy, mixed, mesic Ustollic Haplargids
Techado	Clayey, mixed, nonacid, frigid, shallow Typic Ustorthents
Teco	Fine, mixed, mesic Aridic Haplustalfs
Timhus	Loamy-skeletal over fragmental, mixed, mesic Aridic Ustochrepts
Torreon	Fine, montmorillonitic, mesic Aridic Argiustolls
*Trag	Fine-loamy, mixed Typic Argiborolls
Valnor	Fine, mixed Mollic Eutroboralfs
Venadito	Very fine, montmorillonitic, mesic Udorthentic Chromusterts
Venadito Variant	Very fine, montmorillonitic, mesic Udic Chromusterts
Vessilla	Loamy, mixed (calcareous), mesic Lithic Ustorthents
Viuda	Clayey, mixed, mesic Lithic Ustollic Haplargids
Warm Springs	Fine-loamy, mixed, mesic Aquic Calciustolls
Winona	Loamy-skeletal, carbonatic, mesic Lithic Ustollic Calciorthids
*Yankee	Fine, mixed Vertic Argiborolls
Zia	Coarse-loamy, mixed (calcareous), mesic Ustic Torriorthents

*U.S. G.P.O.:1993-341-646:80003/SCS

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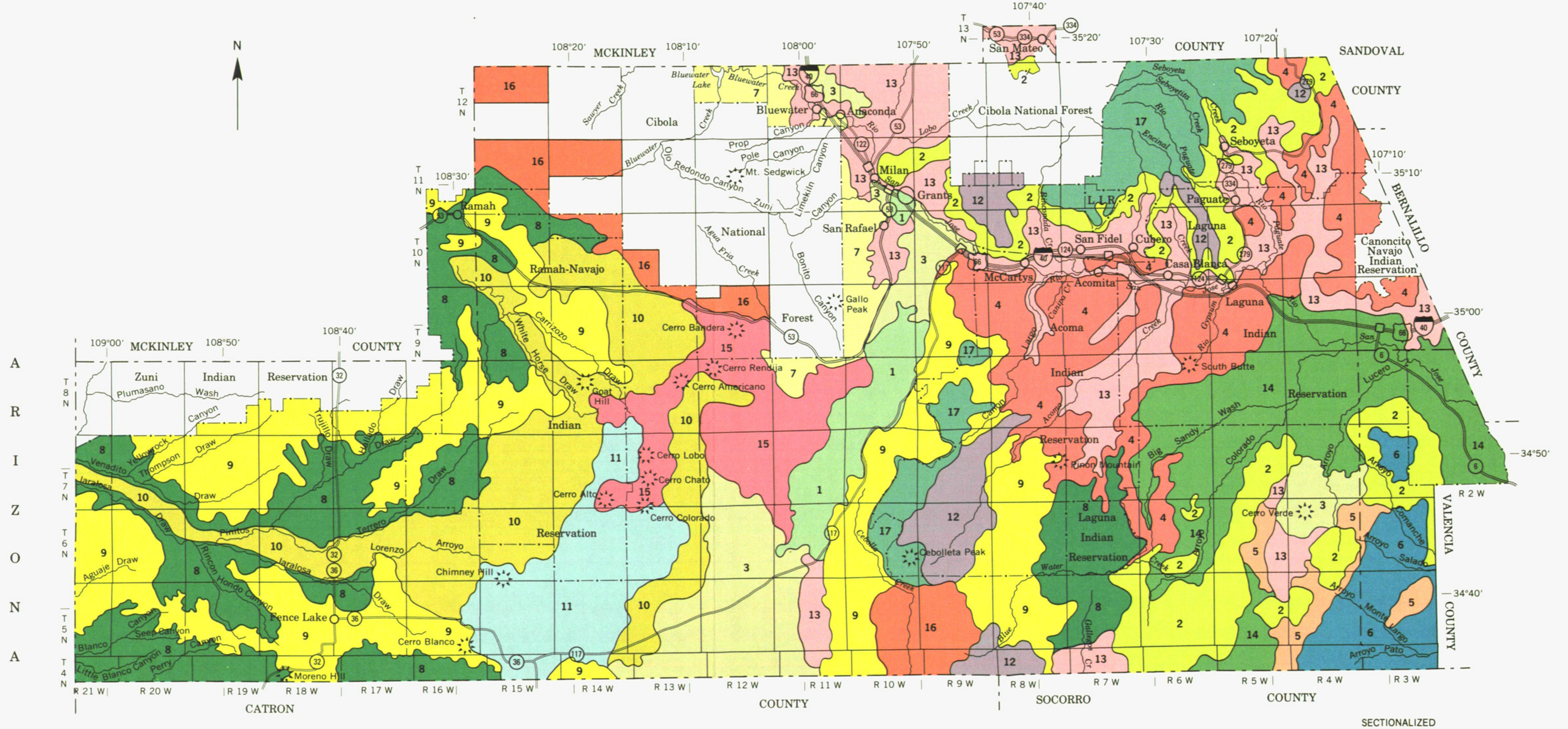


LEGEND

LAVA FLOWS, DRY SOILS, AND ROCK OUTCROP IN AREAS OF HILLS, MESAS, RIDGES, VALLEYS BETWEEN LAVA RIDGES, CUESTAS, FAN TERRACES, AND SWALES

1 — LAVA FLOWS-VIUDA: Lava flows and shallow soils, mainly on hills and ridges

2 — POLEY-ROCK OUTCROP-FLACO: Moderately deep and deep soils and Rock outcrop, mainly on hills, ridges, and mesas

3 — VIUDA-PENISTAJA: Shallow and deep soils mainly on hills and ridges and in valleys between lava ridges

4 — HAGERMAN-ROCK OUTCROP-MION: Shallow and moderately deep soils and Rock outcrop, mainly on mesas, cuestas, hills, and ridges

5 — WINONA-ROCK OUTCROP-TANBARK: Shallow and very shallow soils and Rock outcrop, mainly on mesas, hills, and ridges

6 — HARVEY-NETOMA-OELOP: Deep soils, mainly on mesas, fan terraces, and hills and swales

MOIST SOILS AND ROCK OUTCROP INN AREAS OF HILLS, RIDGES, MESAS, FAN TERRACES, ALLUVIAL FANS, VALLEYS BETWEEN LAVA RIDGES, OTHER VALLEYS, AND PLATEAUS

7 — LAPORTE-ROCK OUTCROP: Shallow soils and Rock outcrop, mainly on hills and ridges

8 — FLUGLE-CATMAN-ROCK OUTCROP: Deep soils and rock outcrop, mainly on mesas, fan terraces, and alluvial fan terraces, and alluvial fans and in valleys

9 — PINITOS-GALESTINA-MION: Shallow and deep soils, mainly on mesas, hills, and ridges

10 — TECO-CABEZON: Shallow and deep soils, mainly on mesas and ridges

11 — CABEZON-CANTINA-MILLPAW: Shallow and deep soils, mainly on hills and ridges, in valleys between lava ridges, and in other valleys

12 — PAGUATE-HACKROY: Moderately deep and shallow soils, mainly on mesas and plateaus

DRY SOILS IN AREAS OF CUESTAS,, FAN TERRACES, FLOOD PLAINS, ALLUVIAL FANS, DRAINAGEWAYS, HILLS, AND RIDGES

13 — PENISTAJA-SAN MATEO-SPARANK: Deep soils, mainly on cuestas, fan terraces, flood plains, and alluvial fans

14 — NAVAJO-GRIETA: Deep soils, mainly on flood plains and alluvial fans, in drainageways, and on fan terraces, hills, and ridges

MOIST SOILS, LAVA FLOWS, AND ROCK OUTCROP IN AREAS OF BASALT PLAINS, SWALES, RIDGES, HILLS, MESAS, PLATEAUS, AND MOUNTAINS

15 — RATON-LAVA FLOWS-CHARO: Very shallow, shallow, and moderately deep soils and Lava flows, mainly on basalt plains, in swales, and on ridges

16 — CINNADALE-VALNOR-TECHADO: Shallow and moderately deep soils, mainly on ridges, hills, mesas, plateaus, and mountains

17 — CEBOLLETA-CHARO-ROCK OUTCROP: Moderately deep soils and Rock outcrop, mainly on hills, mountains, and mesas

Compiled 1992

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF INDIAN AFFAIRS
BUREAU OF LAND MANAGEMENT
NEW MEXICO AGRICULTURAL EXPERIMENT STATION

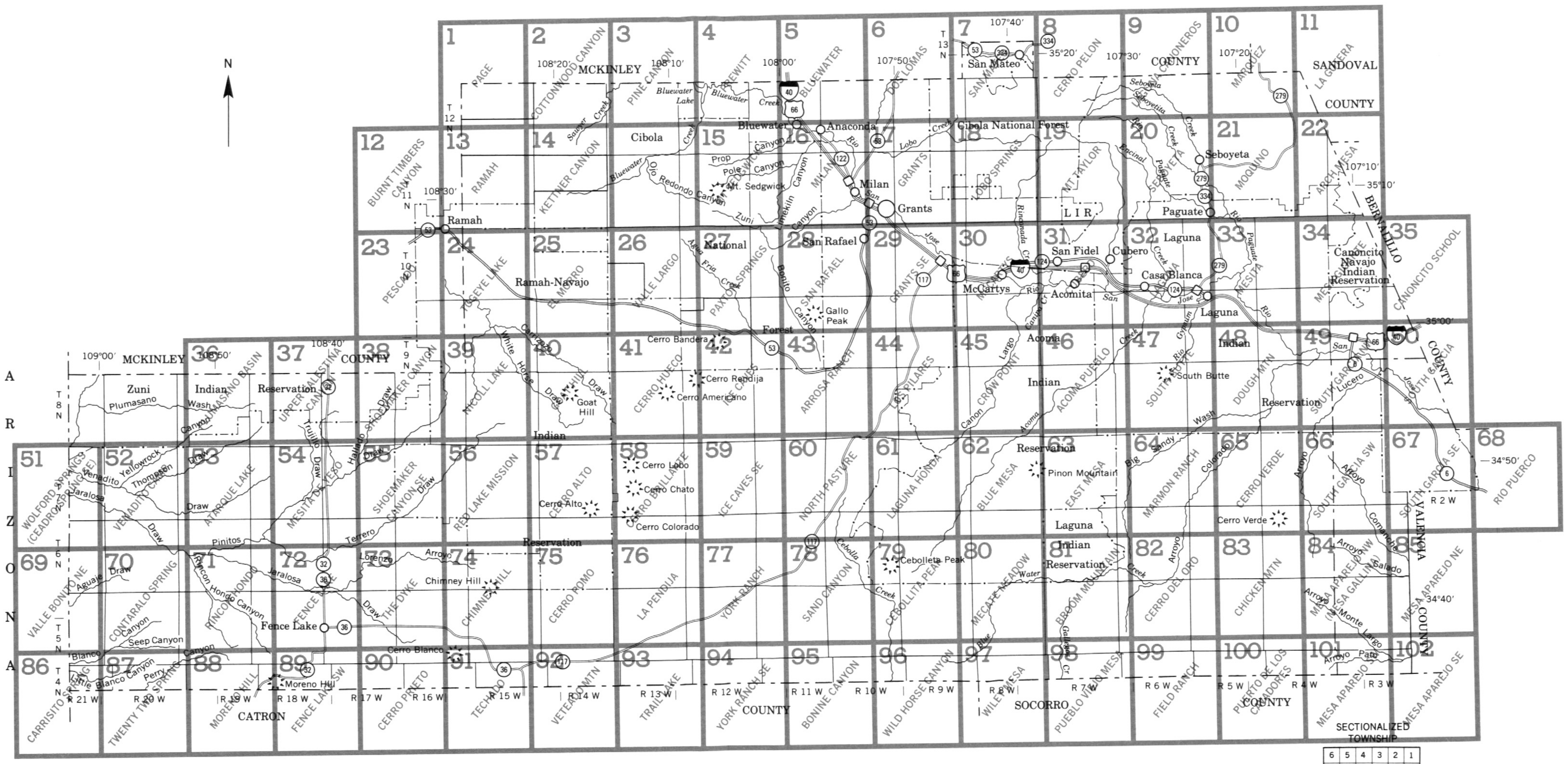
GENERAL SOIL MAP

CIBOLA AREA, NEW MEXICO
PARTS OF CIBOLA, MCKINLEY, AND VALENCIA COUNTIES

Scale 1:506,880

1 0 1 2 3 4 5 6 7 8 Miles

0 8 16 Km



SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

INDEX TO MAP SHEETS

CIBOLA AREA, NEW MEXICO
PARTS OF CIBOLA, MCKINLEY, AND VALENCIA COUNTIES

Scale 1:506,880

1 0 1 2 3 4 5 6 7 8 Miles

0 8 16 Km

SOIL LEGEND

10	Lava flows
20	Penistaja fine sandy loam, 1 to 3 percent slopes
21	Clovis sandy clay loam, 1 to 3 percent slopes
25	Hickman-Catman complex, 1 to 6 percent slopes
30	Warm springs loam, 0 to 2 percent slopes
40	Aparejo clay loam, 0 to 1 percent slopes
41	Aparejo clay loam, sandy substratum, 0 to 1 percent slopes
45	Aparejo clay, 0 to 1 percent slopes
50	Venadito clay loam, 0 to 1 percent slopes
51	Venadito sandy clay loam, 0 to 1 percent slopes
52	Venadito Variant clay loam, 0 to 1 percent slopes
55	Glenberg-San Mateo complex, 0 to 2 percent slopes
56	Mespun loamy sand, 1 to 5 percent slopes
57	San Mateo loam, 1 to 3 percent slopes
58	San Mateo sandy clay loam, 1 to 3 percent slopes
60	Sparank clay loam, 1 to 3 percent slopes
61	Sparham clay loam, 0 to 2 percent slopes
62	Sparank sandy clay loam, saline sodic, 1 to 3 percent slopes
66	Zia fine sandy loam, 3 to 5 percent slopes
70	Catman clay loam, 1 to 3 percent slopes
72	Catman Variant clay loam, 1 to 3 percent slopes
73	Catman sandy clay loam, 1 to 3 percent slopes
75	Hickman sandy clay loam, 1 to 3 percent slopes
100	Manzano loam, 1 to 5 percent slopes
120	Rock outcrop-Laporte complex, 30 to 60 percent slopes
130	Laporte-Rock outcrop complex, 3 to 20 percent slopes
200	Penistaja fine sandy loam, 2 to 10 percent slopes
205	Ildefonso very gravelly sandy loam, 3 to 15 percent slopes
210	Bond-Penistaja-Rock outcrop complex, 2 to 15 percent slopes
218	Viuda-Penistaja-Rock outcrop complex, 1 to 10 percent slopes
230	Dumps-Pits complex
251	Skyvillage-Rock outcrop-Bond complex, 3 to 40 percent slopes
257	Sparank-San Mateo complex, 0 to 5 percent slopes
259	Mikim loam, 1 to 5 percent slopes
262	Poley-Pojoaque very cobbly loams, 5 to 30 percent slopes
264	Tapia sandy loam, 1 too 5 percent slopes
270	Charo loam, 0 to 5 percent slopes
272	Cebolleta-Borrego-Rock outcrop complex, 1 to 15 percent slopes
276	Trag loam, 1 to 8 percent slopes
278	Microy-Rock outcrop complex, 5 to 30 percent slopes
282	Cebolleta cobbly loam, 2 to 10 percent slopes, very stony
284	Cebolleta-Rock outcrop complex, 15 to 50 percent slopes
286	Cebolleta-Raton complex, 1 to 5 percent slopes
290	Paguate-Hackroy complex, 1 to 5 percent slopes
291	Paguate cobbly clay loam, 1 to 5 percent slopes
294	Parkay-Rock outcrop complex, 15 to 45 percent slopes
300	Saladon clay loam, 0 to 5 percent slopes
310	Mirabel very gravelly loam, 2 to 15 percent slopes
315	Abersito, cobbly-Abersito-Rock outcrop association, 5 to 30 percent slopes
320	Cinnadale gravelly very fine sandy loam, 1 to 15 percent slopes
325	Moreno Variant loam, 2 to 10 percent slopes
330	Moreno loam, 1 to 10 percent slopes
340	Yankee silty clay loam, 0 to 3 percent slopes
350	Rock outcrop-Stout complex, 3 to 15 percent slopes
406	Poley-Rock outcrop complex, 2 to 25 percent slopes
407	Viuda-Rock outcrop complex, 1 to 10 percent slopes
419	Navajo silty clay loam, 1 to 5 percent slopes
420	Navajo-Suwanee complex,, 1 to 5 percent slopes
424	Mespun-Palma association, 1 to 12 percent slopes
426	Sheppard-Shiprock association 1 to 12 percent slopes
432	Winona-Rock outcrop complex, 3 to 20 percent slopes
434	Rizozo-Rock outcrop association, 3 to 55 percent slopes
446	Harvey-Oelop association, 0 to 5 percent slopes
476	Saido loam, 1 to 12 percent slopes
485	Rock outcrop-Mion complex, 15 to 65 percent slopes
487	Mion-Badland complex, 20 to 65 percent slopes
500	Timhus-Bandera association, 20 to 50 percent slopes
505	Flugle-Goesling loamy fine sands, 1 to 8 percent slopes
514	Raton-Rock outcrop complex, 1 to 10 percent slopes
515	Rock outcrop-Vessilla-Mion complex, 3 to 55 percent slopes
518	Borrego-Charo-Rock outcrop complex, 1 to 10 percent slopes
520	Celacy-Atarque complex, 1 to 10 percent slopes
522	Bandera association, 15 to 45 percent slopes
523	Charo-Raton complex, 1 to 10 percent slopes
525	Catman-Silkie association, 1 to 10 percent slopes
535	Millpaw loam, 0 to 5 percent slopes
536	McGaffey loam, 1 to 5 percent slopes
537	Milpaw-Loarc complex, 0 to 10 percent slopes
540	Montecito fine sandy loam, 1 to 15 percent slopes
550	Nogal-Galestina sandy loam, 1 to 10 percent slopes
555	Pinitos-Ribera sandy loams, 1 to 10 percent slopes
560	Flugle-Teco association, 1 to 8 percent slopes
561	Flugle-Quintana complex, 2 to 15 percent slopes
565	Quintana sandy loam, 5 to 15 percent slopes
570	Torreon-Rock outcrop-Cabezon complex, 15 to 45 percent slopes
575	Teco-Atarque association, 1 to 8 percent slopes
576	Teco sandy loam, 2 to 5 percent slopes
577	Cabezon-Montecito-Rock outcrop association, 1 to 10 percent slopes
579	Cabezon-Cantina complex, 1 to 7 percent slopes
581	Laporte-Vessilla complex, 3 to 15 percent slopes
582	Kenray fine sand, 3 to 15 percent slopes
585	Moncha silt loam, 2 to 10 percent slopes
586	Venadito-Teco association, 0 to 10 percent slopes
591	Valnor-Techado association, 2 to 25 percent slopes
610	Grieta-Shiprock association, 1 to 10 percent slopes
611	Grieta-Kiki sandy loams, 3 to 15 percent slopes
615	Trag-Techado-Rock outcrop complex, 3 to 55 percent slopes
618	Netoma sandy loam, 2 to 12 percent slopes
619	Venadito clay loam, 1 to 5 percent slopes
620	Aparejo-Venadito complex, 1 to 5 percent slopes
625	Hagerman-Bond association, 1 to 10 percent slopes
630	Bond-Rizozo-Rock outcrop complex, 2 to 20 percent slopes
640	Flaco-Berto loams, 0 to 5 percent slopes
641	Berto-Flaco cobbly loams, 1 to 10 percent slopes
645	Penistaja-Oelop association,, 0 to 5 percent slopes
650	Winona-Tanbark-Rock outcrop association, 15 to 60 percent slopes
660	Rana-Rock outcrop complex, 2 to 25 percent slopes
	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state, or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail (maintained)

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

DAMS

- Tanks

PITS

- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Windmill

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Spring
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS — 10 487

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

MISCELLANEOUS

- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 1

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 2

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 3

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 4
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

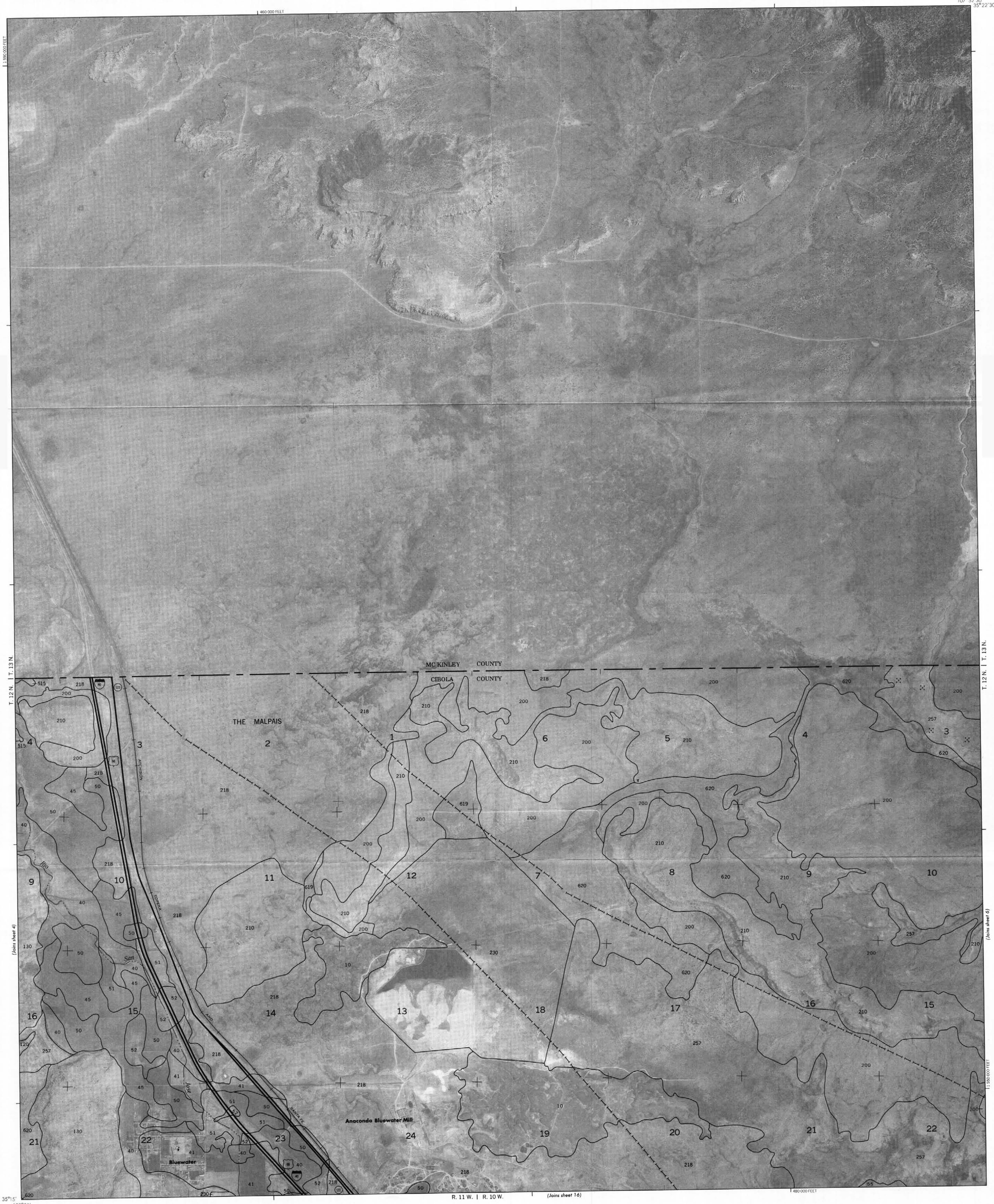
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 4

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 5

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

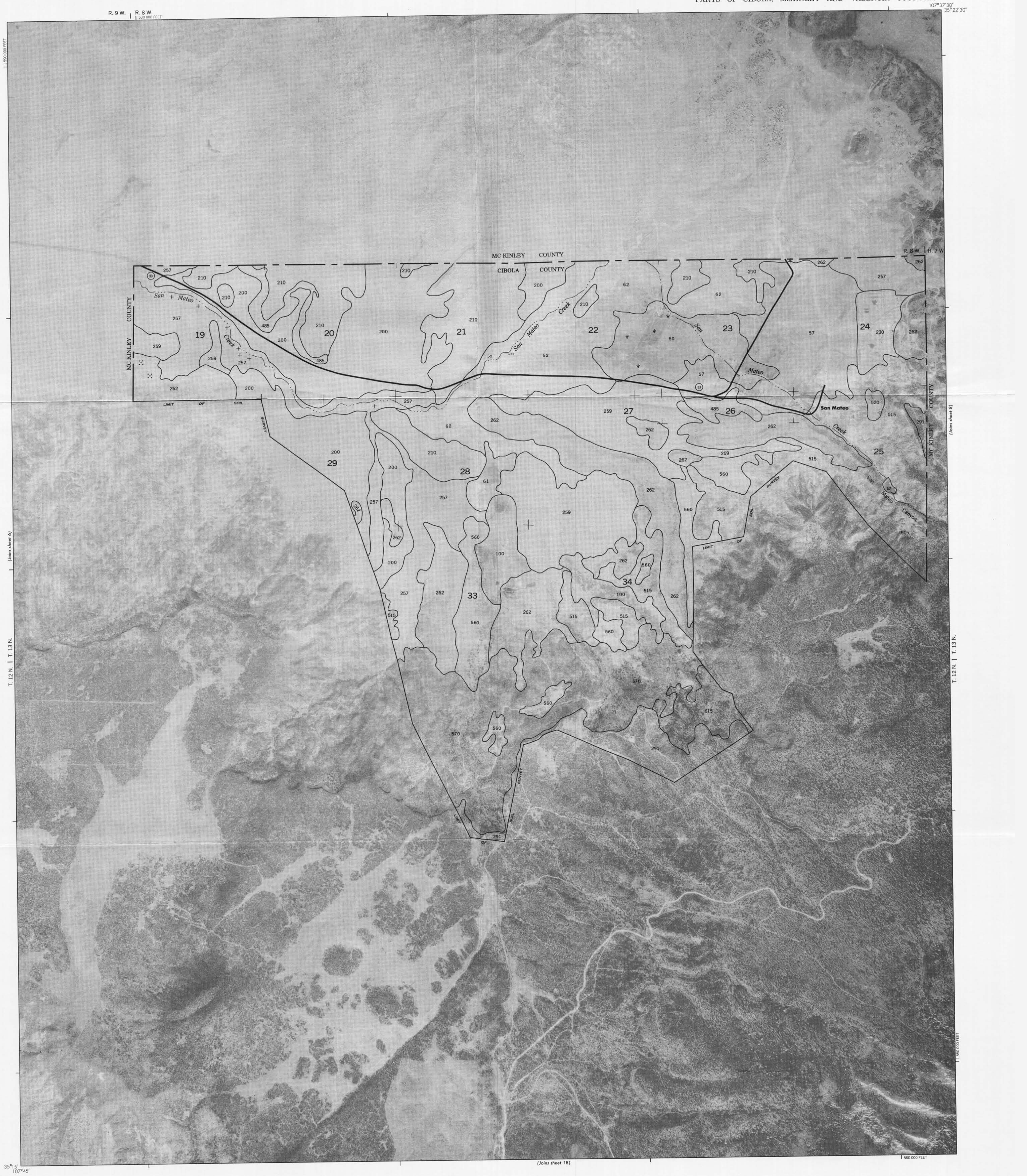
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 6

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 7

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

570 000 FEET

R. 7 W. | R. 6 W.

107°30'
35°22'30"

1 590 000 FEET

T. 13 N.
T. 12 N.

(Joins sheet 7)

(Joins sheet 9)

1 550 000 FEET

35°15'
107°37'30"

590 000 FEET

(Joins sheet 19)

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

CIBOLA AREA, NEW MEXICO NO. 8

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 9

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 10

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 11

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 12

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 13

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 14

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 15
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

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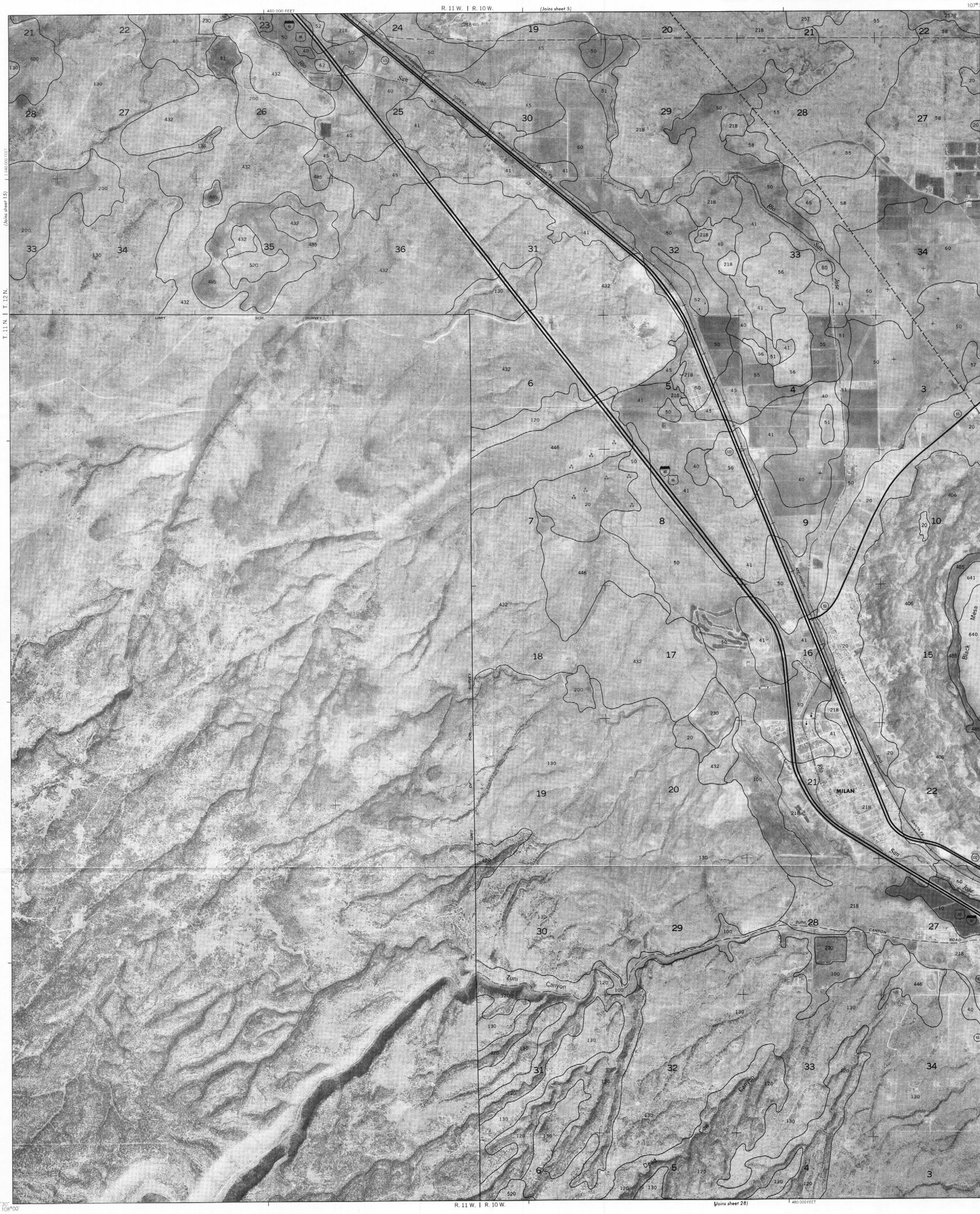
CIBOLA AREA, NEW MEXICO NO. 15



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 16

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 17

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

CIBOLA AREA, NEW MEXICO NO. 18

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 19

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

CIBOLA AREA, NEW MEXICO NO. 20

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 21

N

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

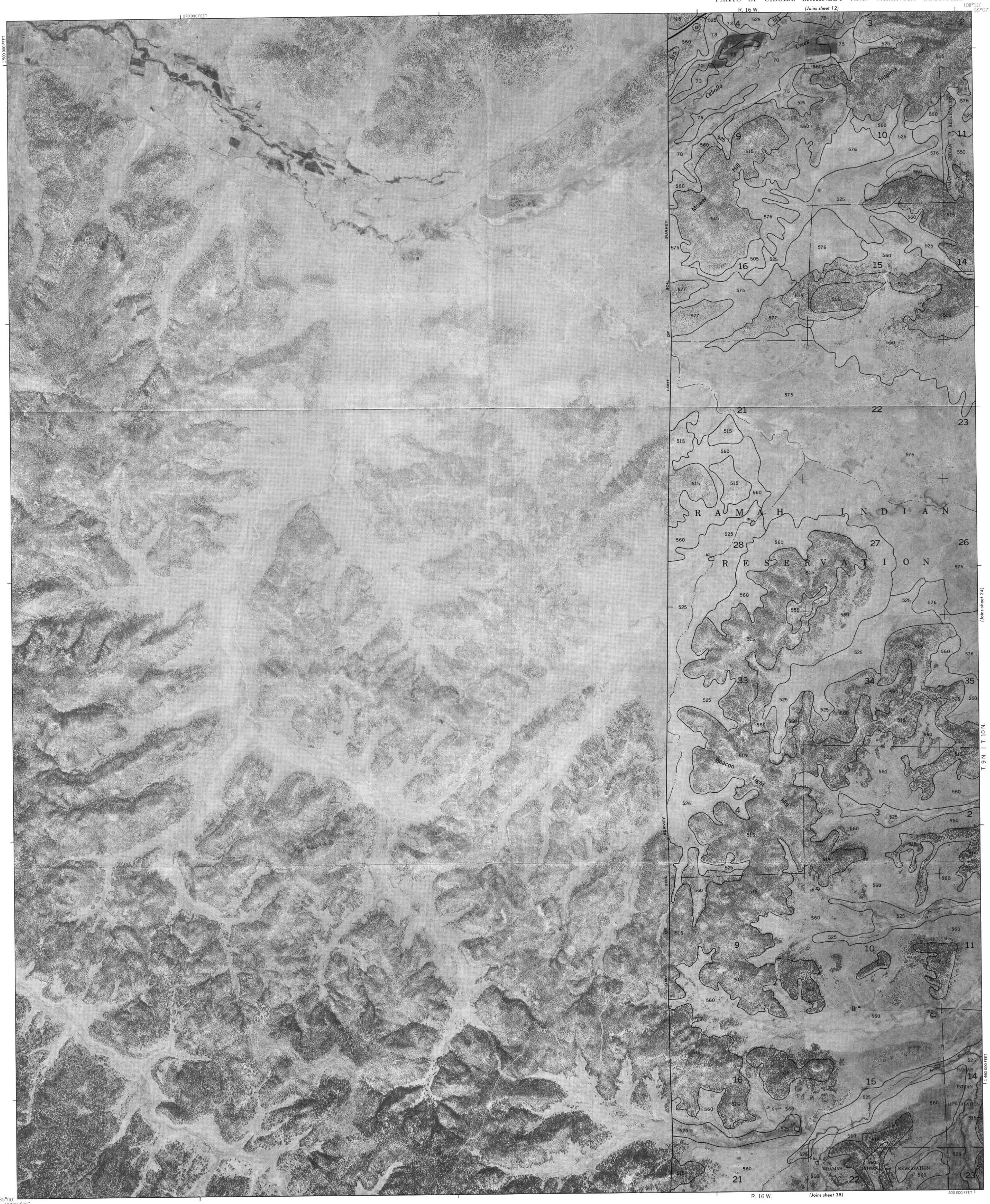
N

CIBOLA AREA, NEW MEXICO NO. 22

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 23
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES



1" 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 23

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 24

N

R. 15 W. | R. 14 W.

(Joins sheet 14)

108°15'
35°07'30"

(Joins sheet 24)

(Joins sheet 26)

T. 9 N. | T. 10 N.

35°00'
108°22'30"

R. 15 W. | R. 14 W.

(Joins sheet 40)

R. 14 W. | R. 13 W.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 25

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

CIBOLA AREA, NEW MEXICO NO. 26

N

SCALE 1:24 000

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 27

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 28

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

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CIBOLA AREA, NEW MEXICO NO. 29

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 30
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 30

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 31
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 31

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 32

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

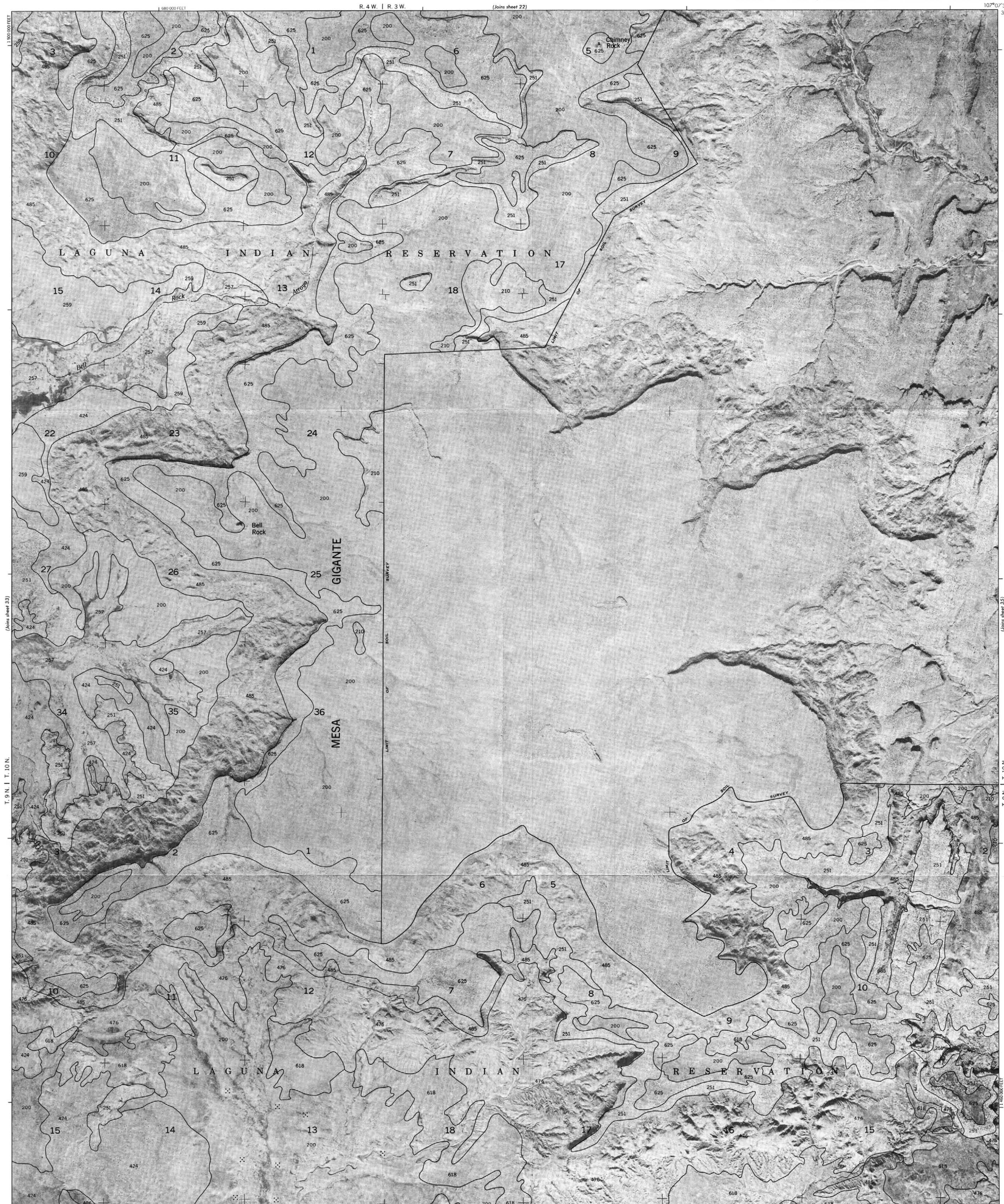
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 33

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 34

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 35

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 36

N

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 37

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 38

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 39

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 40

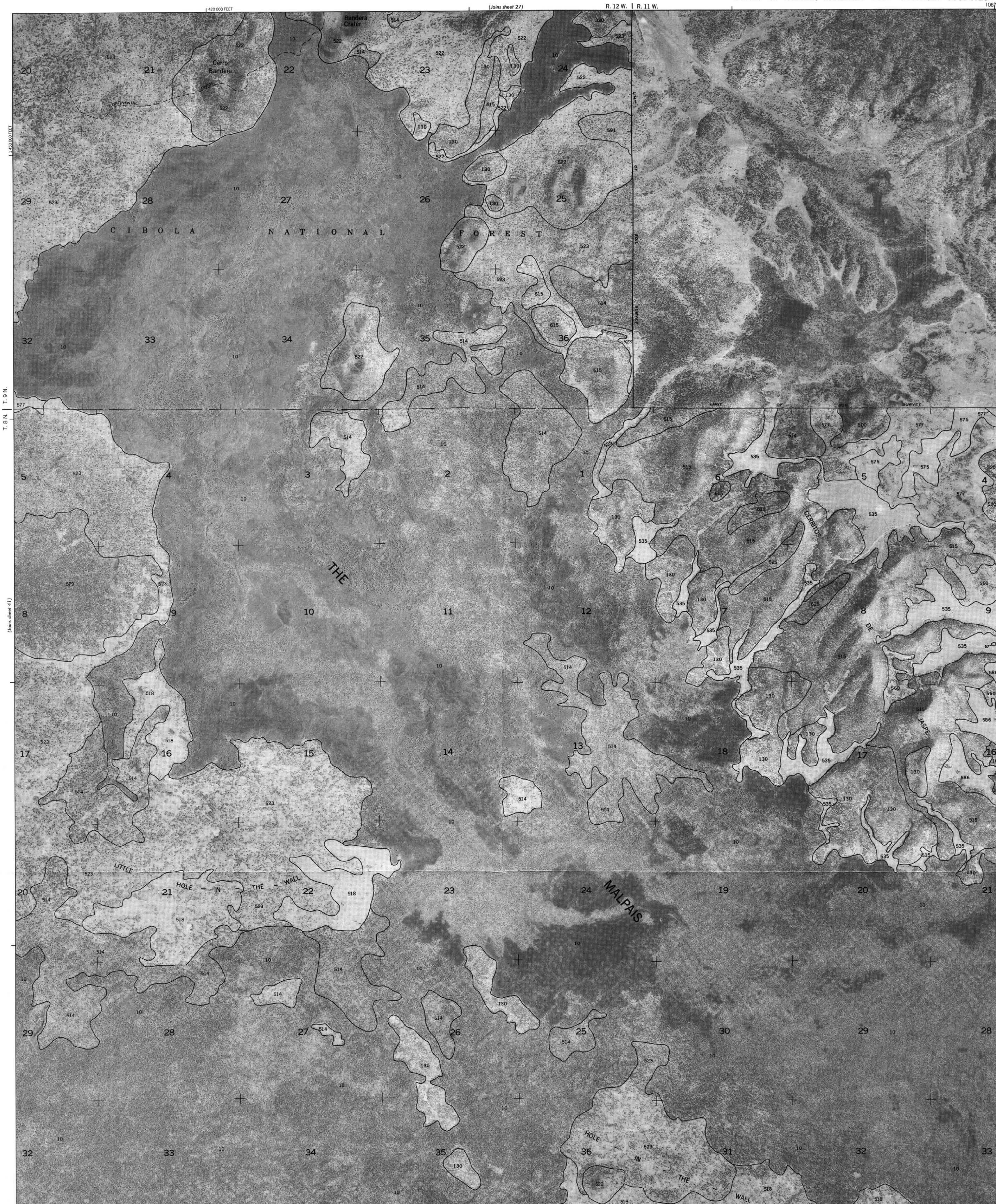
N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 41

N

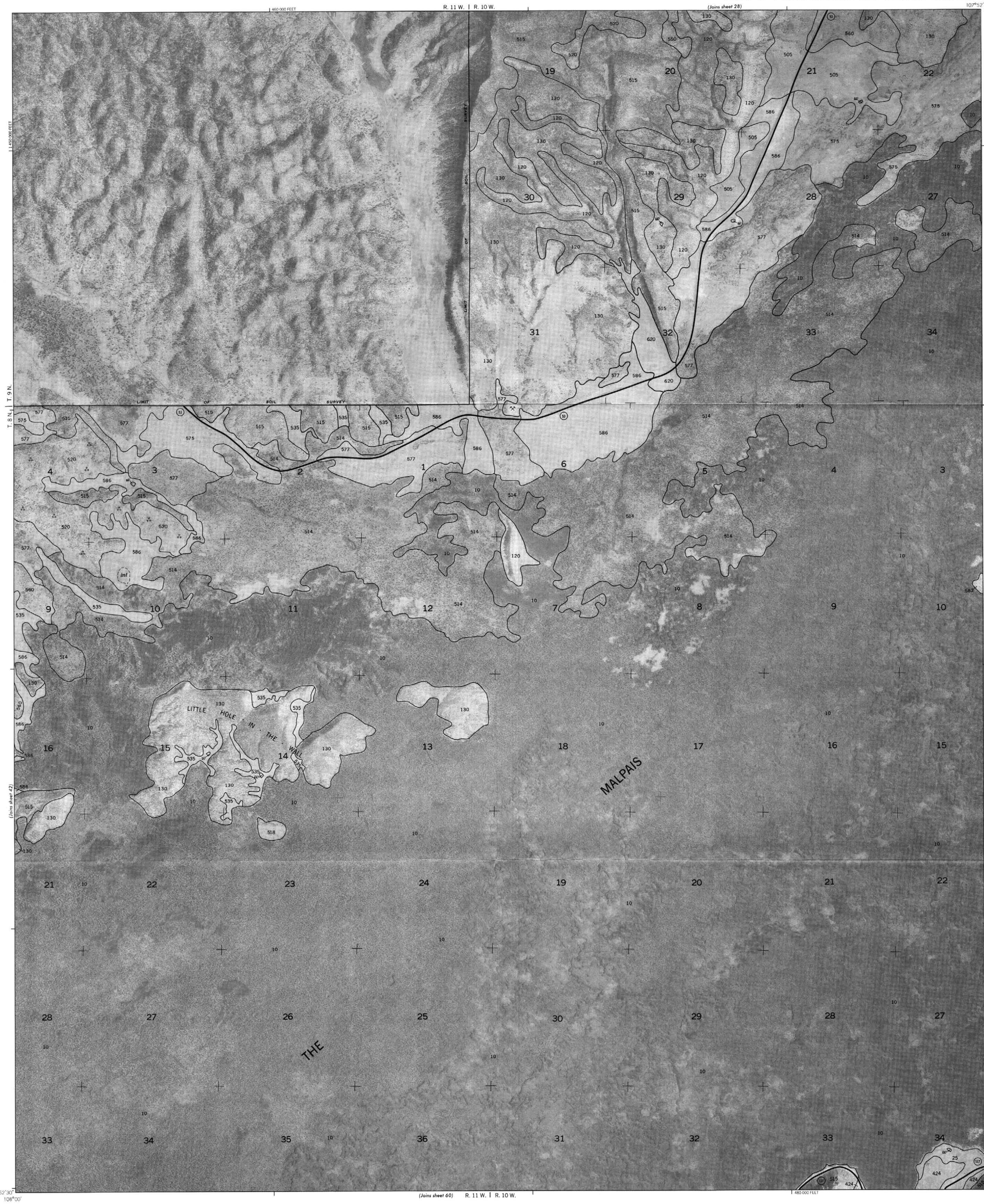
This soil survey map was compiled by the U.S. Department of Agriculture Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 42

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 43

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 44

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

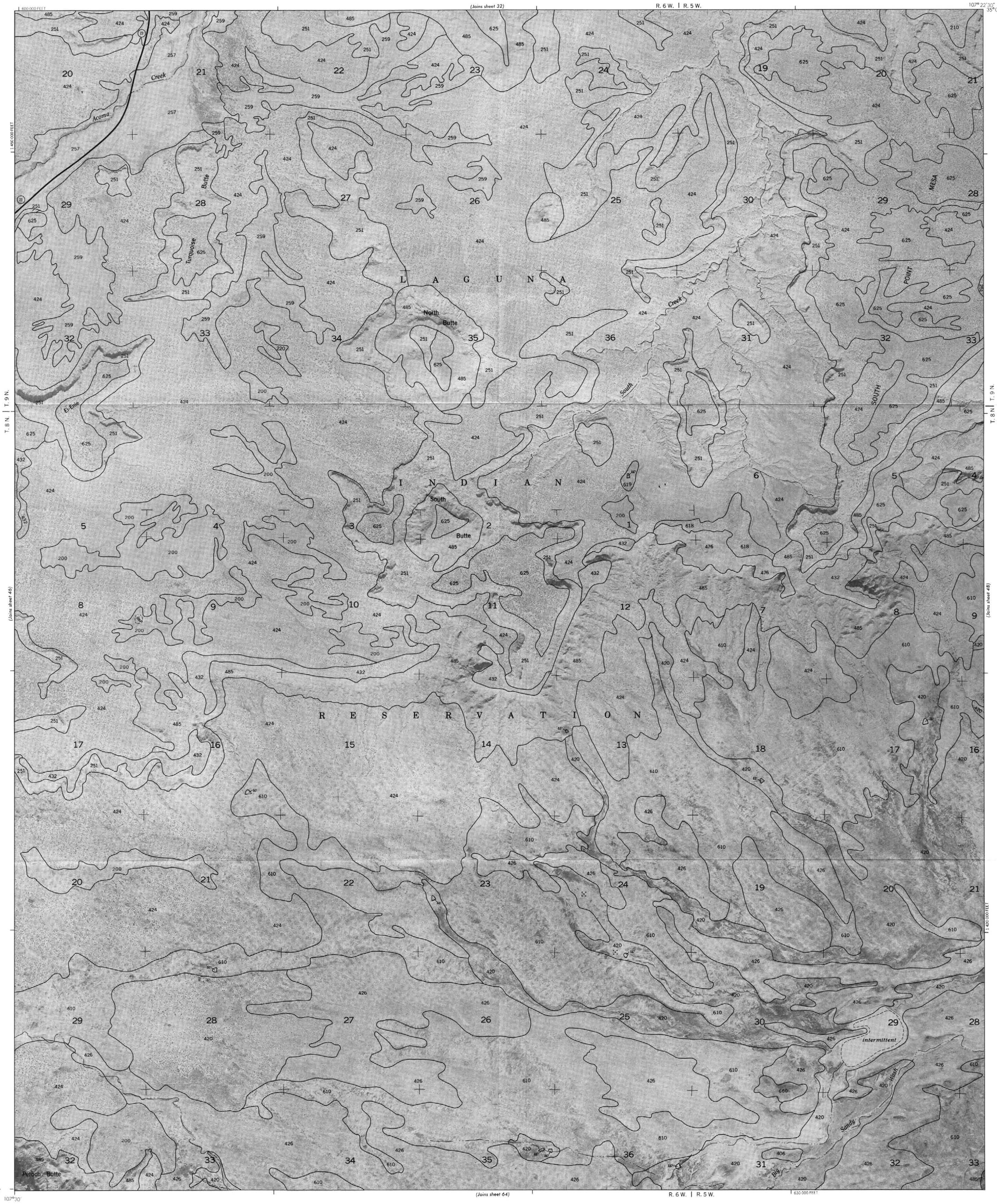
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 45

N

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 46

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES

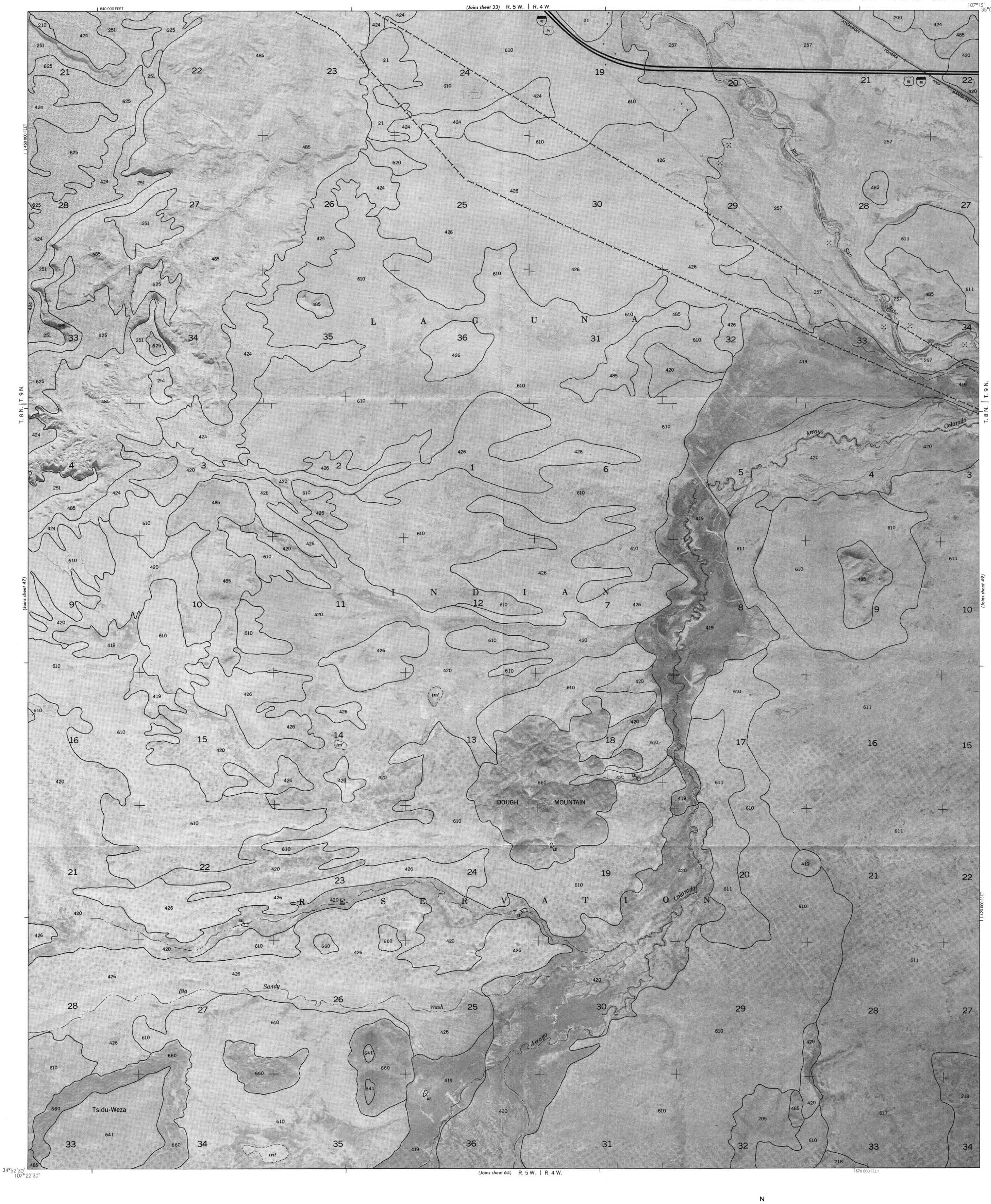
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 47

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

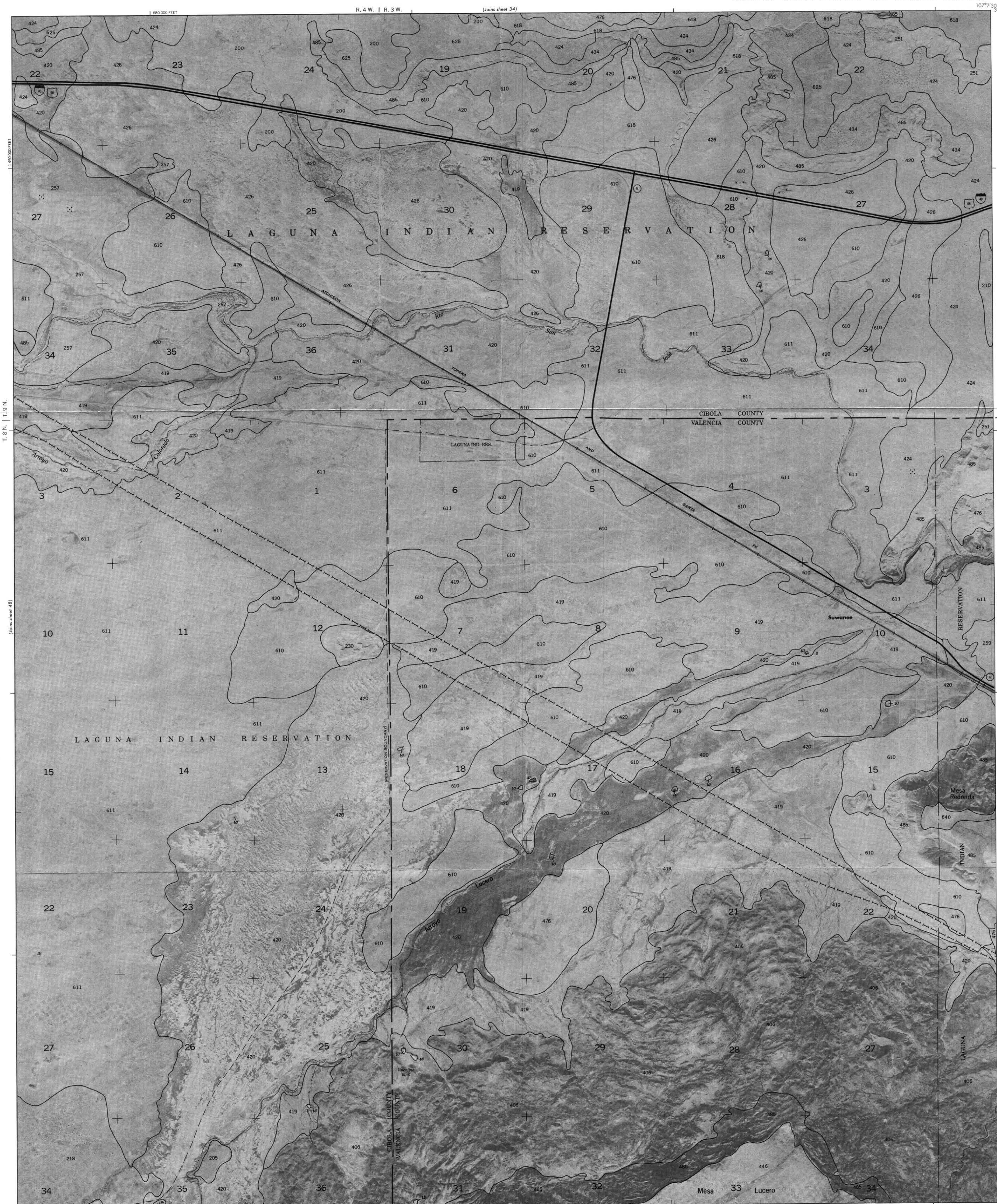
1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 48

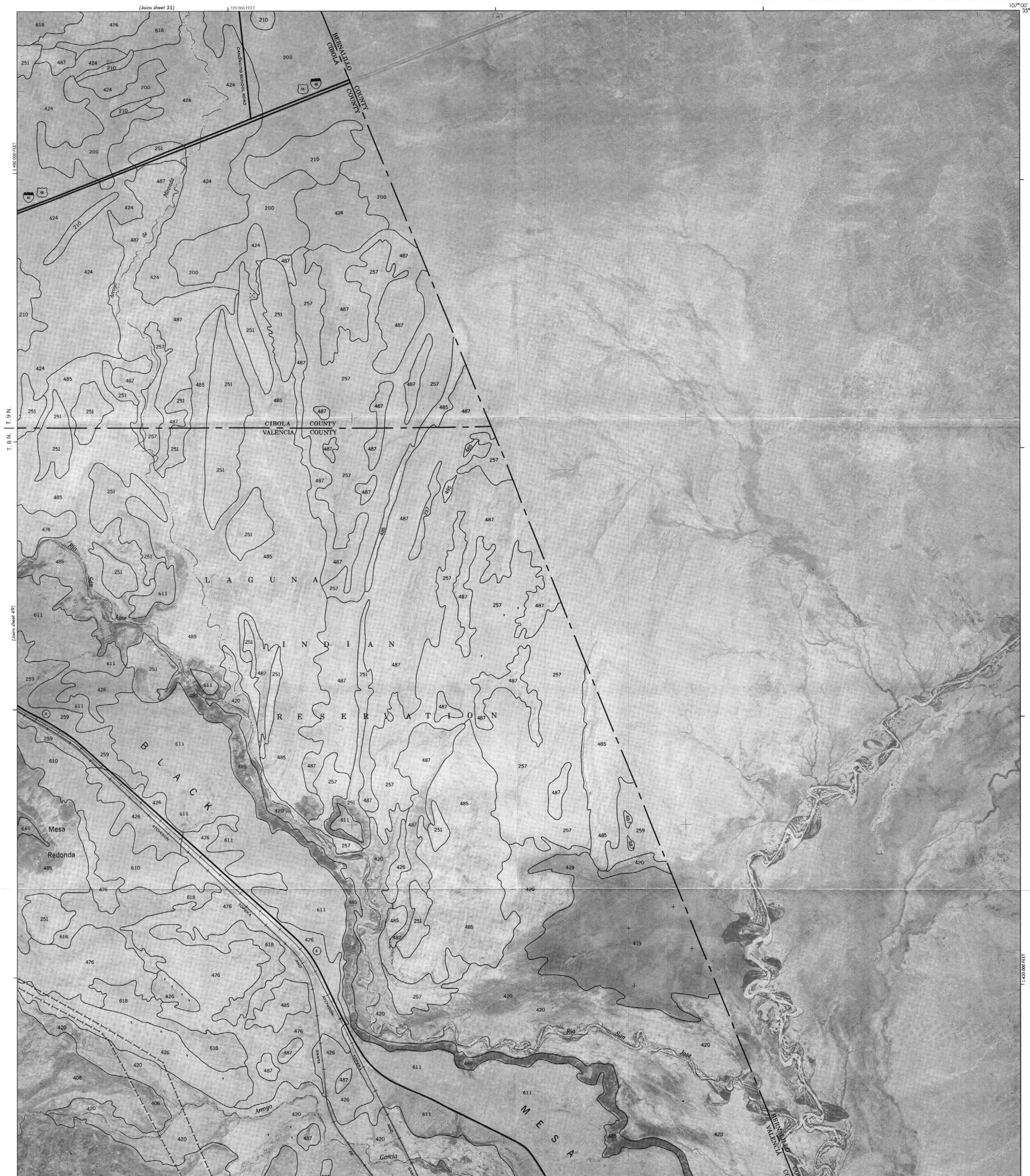
N



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 49



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 50

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 51

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 52
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 52

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 53

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

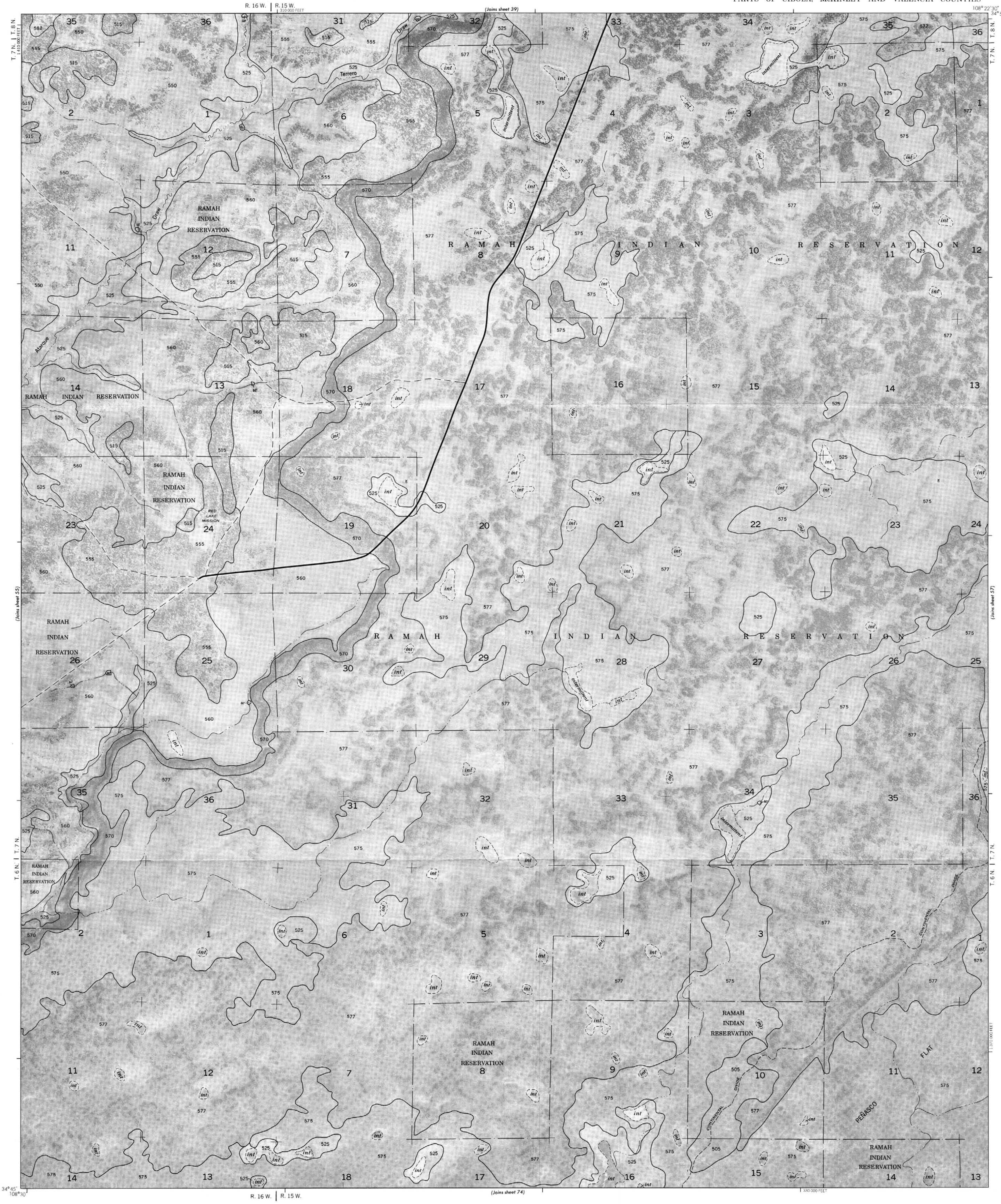
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 54

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 55

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

CIBOLA AREA, NEW MEXICO NO. 56

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CIBOLA AREA, NEW MEXICO
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 57

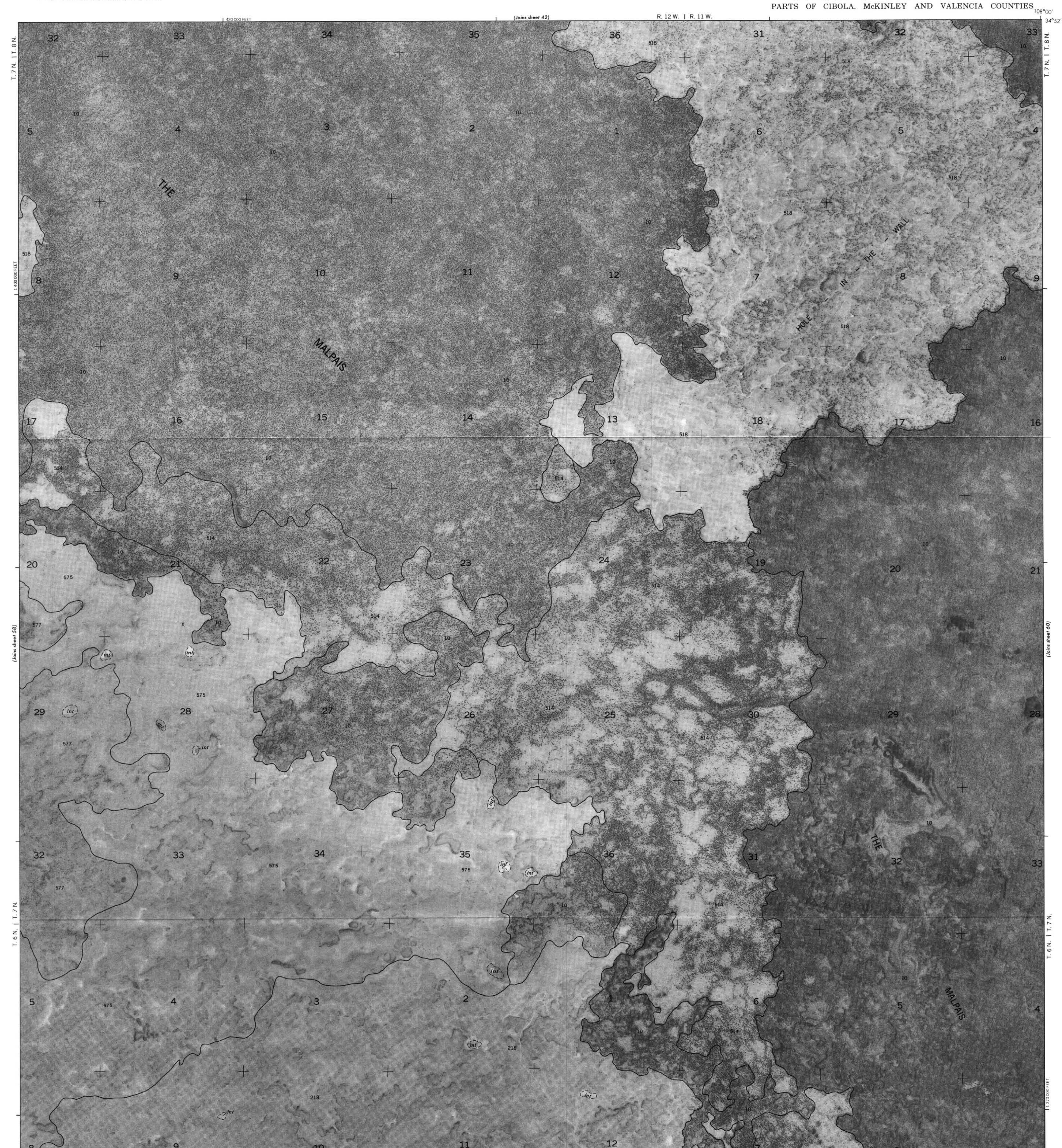
N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 58

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 59

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 60

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 61

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 62

N

1 3/4 1/2 1/4 0 1 2 MILES

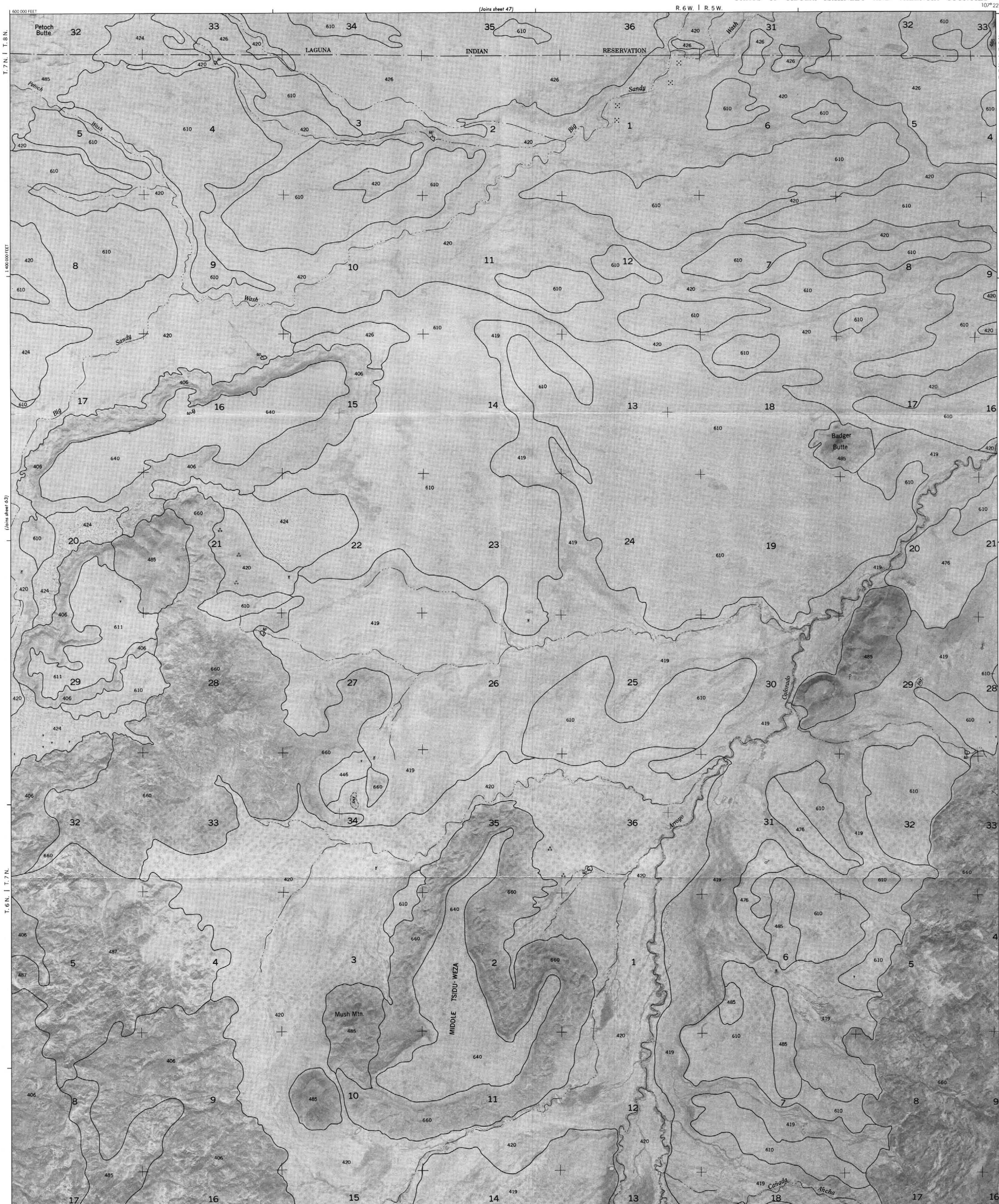
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 64

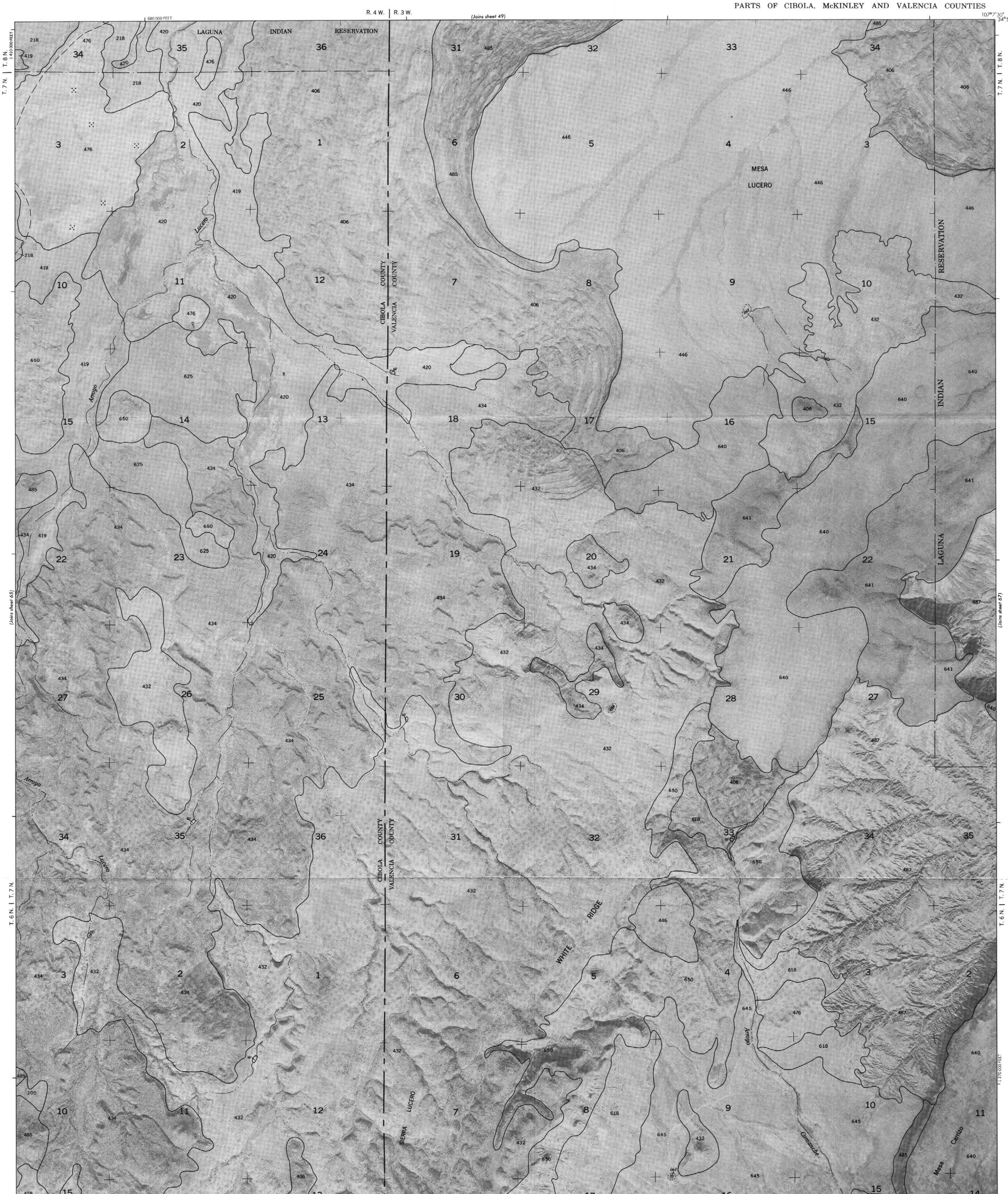
N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

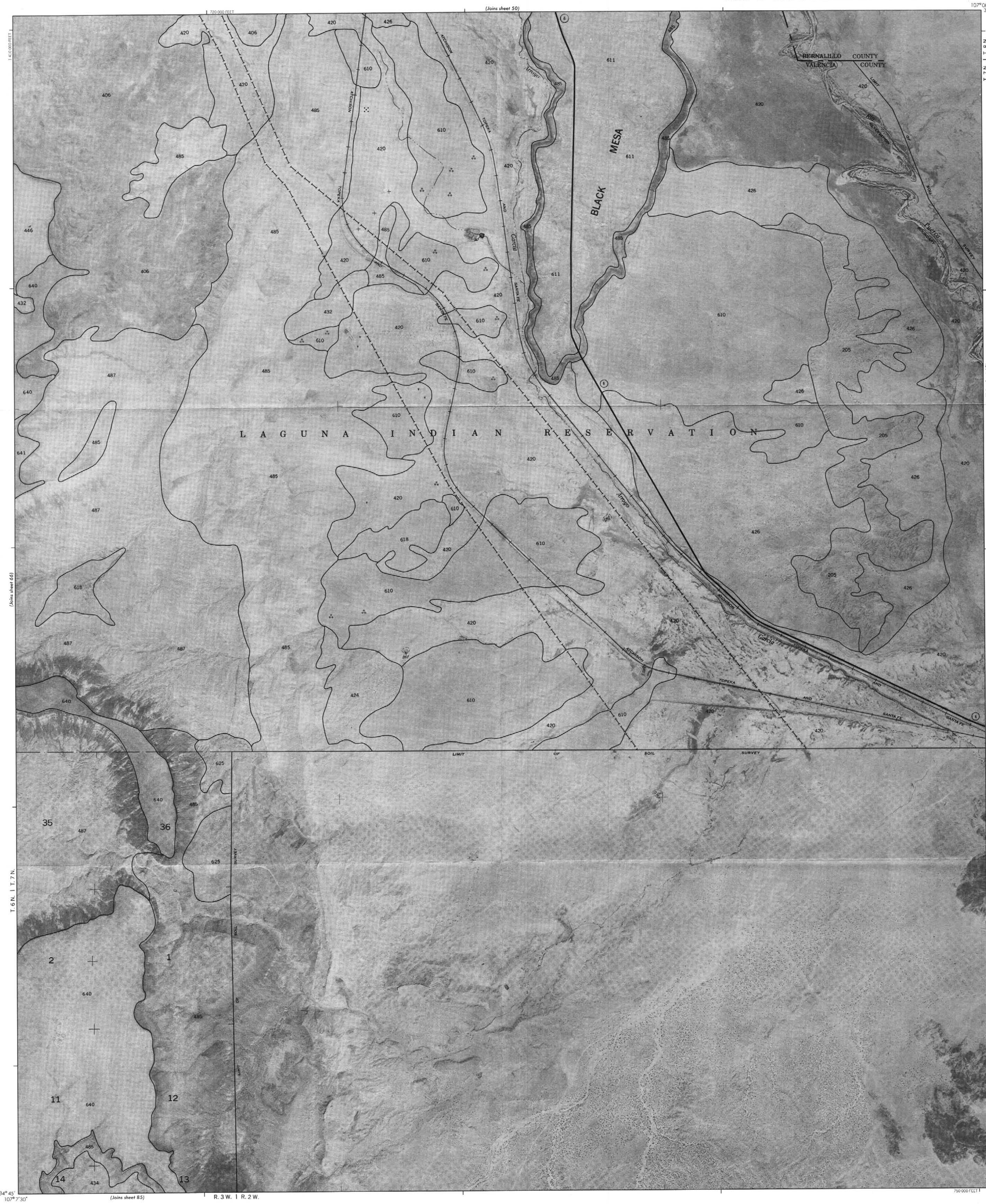
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 65

N



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 66

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



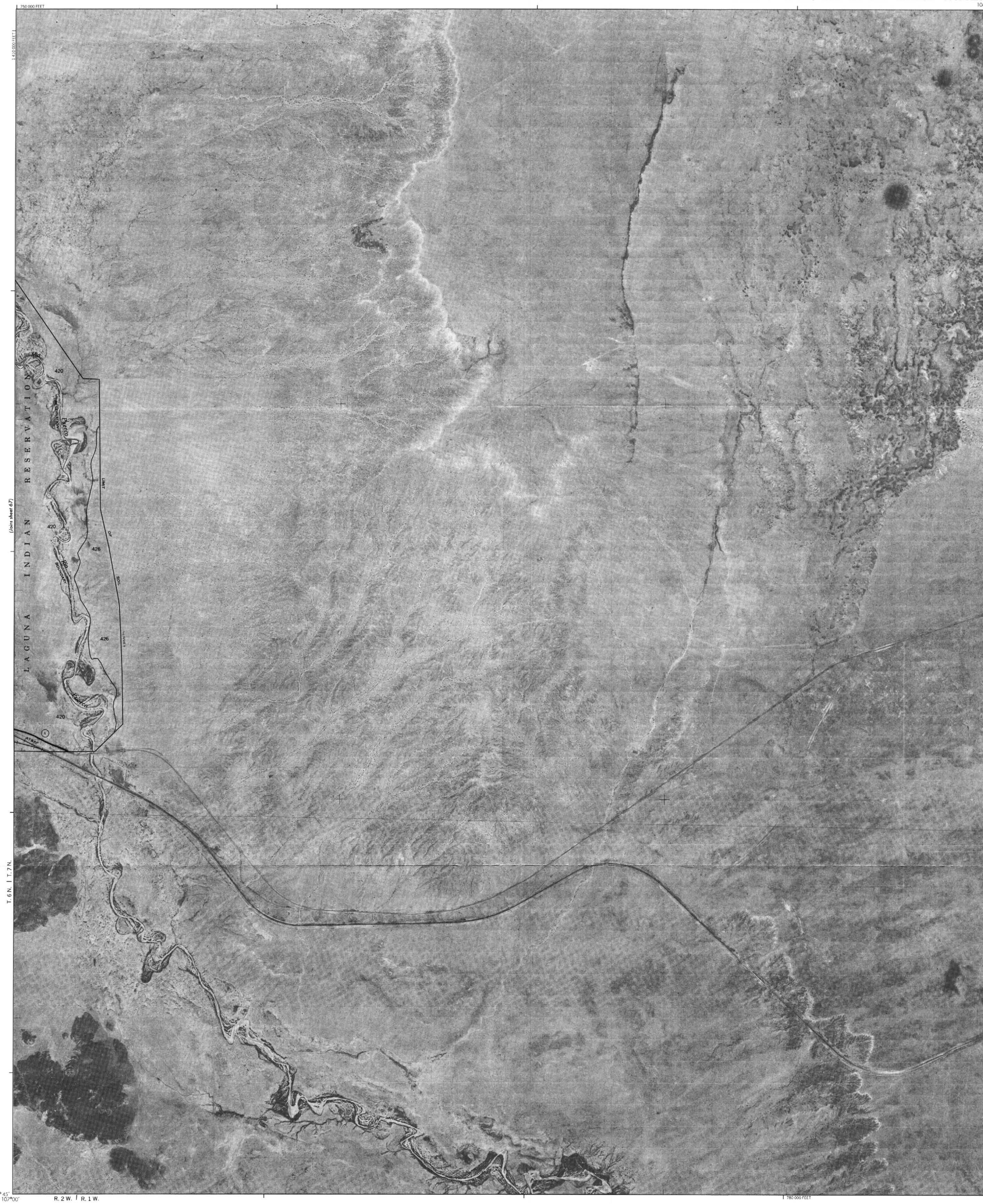
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 67

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 68
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 68

N

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 69

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 70

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 71

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 72

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 73
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1	3/4	1/2	1/4	0		1	2 MILES

1	0.5	0		1	2 KILOMETERS

SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 73

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

R. 16 W. | R. 15 W.

(Joins sheet 56)

(Joins sheet 91)

R. 16 W. | R. 15 W.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 74

N

1 3/4 1/2 1/4 0 1 2 MILES

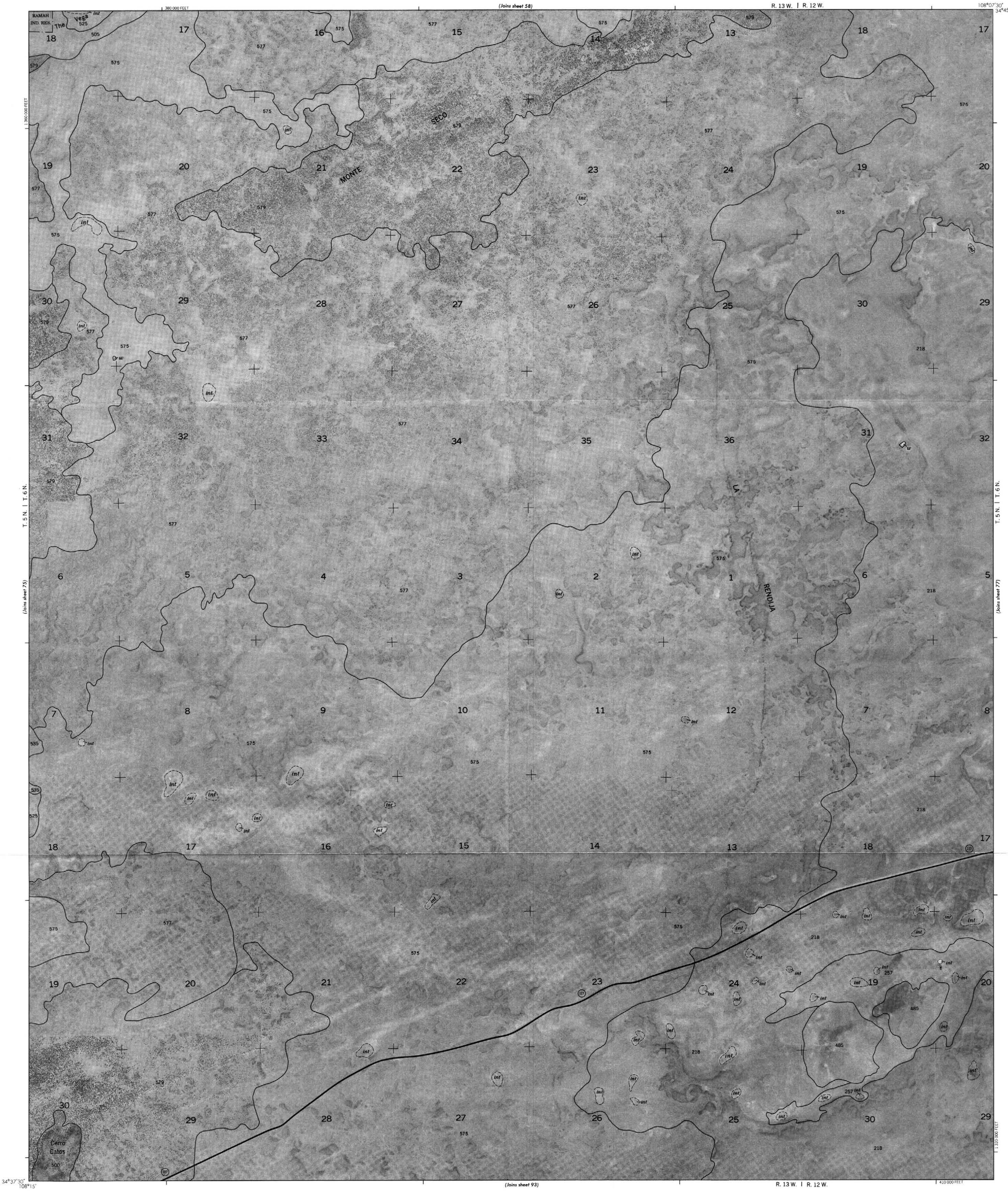
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 75

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 76

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 77

N

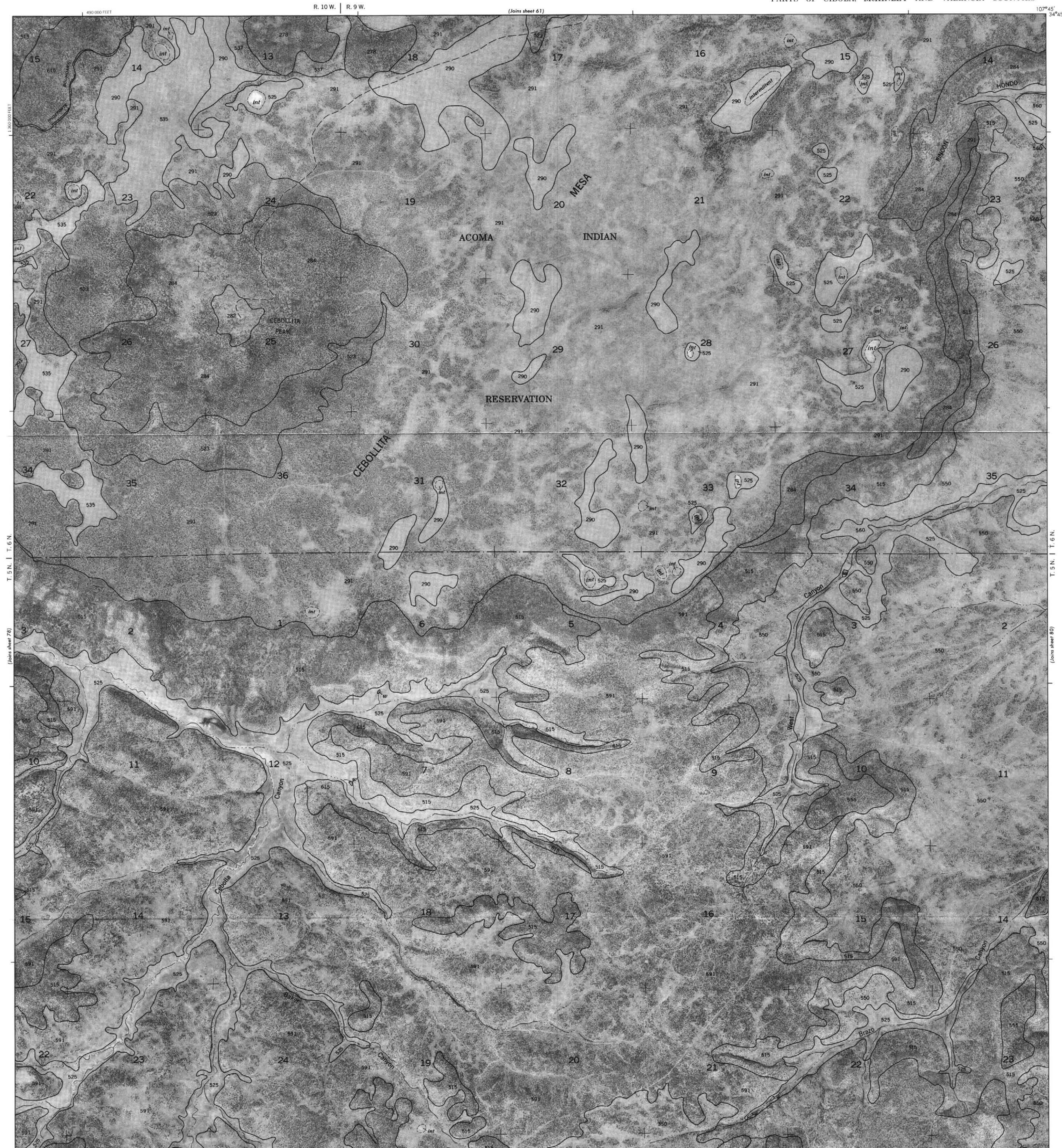
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 78

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 79

N

R. 9 W. | R. 8 W.

(Joins sheet 62)

107°37'30"
34°45'

34°37'30"
107°45'

R. 9 W. | R. 8 W.

(Joins sheet 97)

560 000 FEET

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 80

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

N

CIBOLA AREA, NEW MEXICO NO. 81

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SCALE 1:24 000
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 83

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CIBOLA AREA, NEW MEXICO NO. 84

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 85
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 85

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 86

N

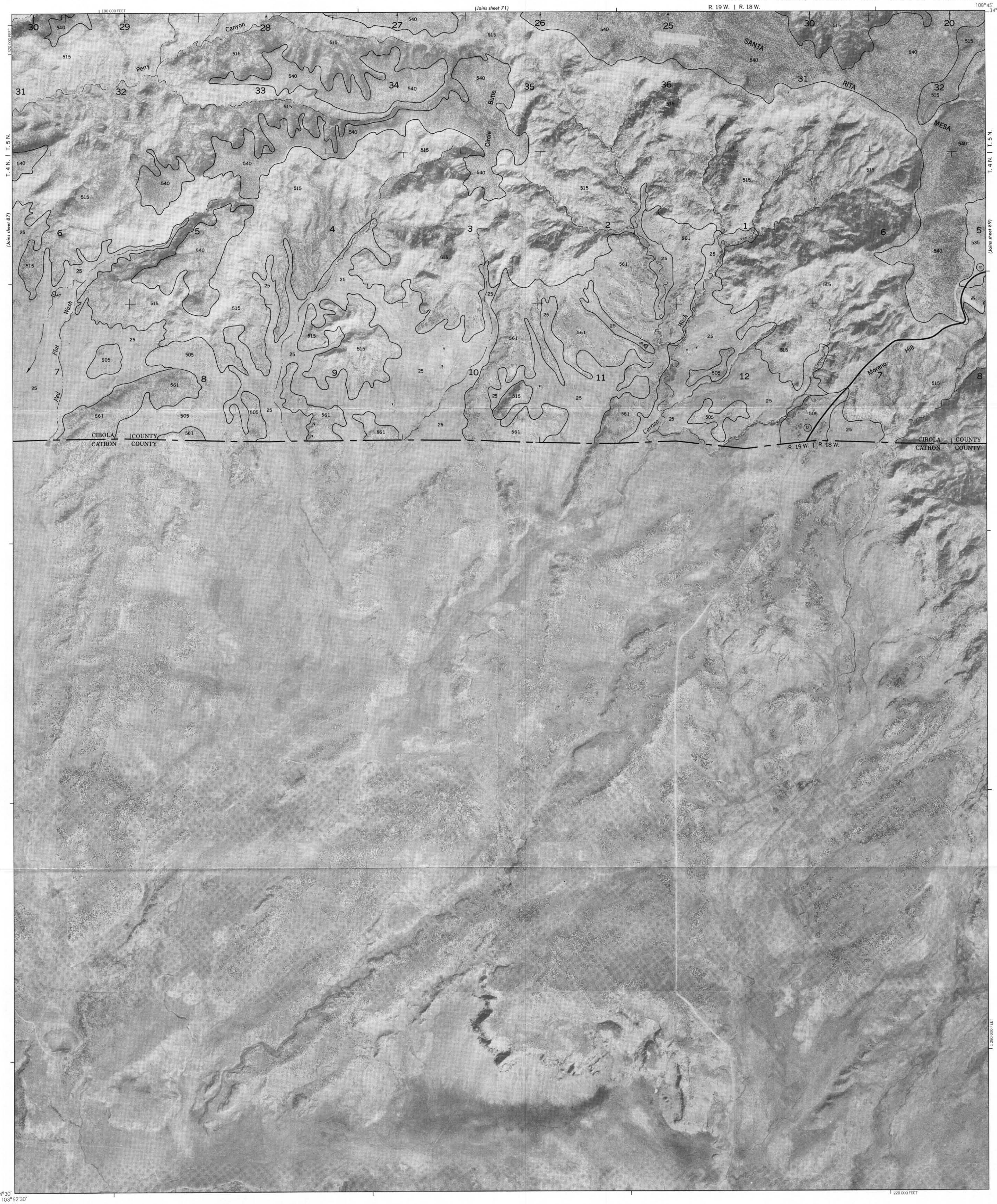
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 87

N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 1974 - 1982 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 88

N

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 89
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

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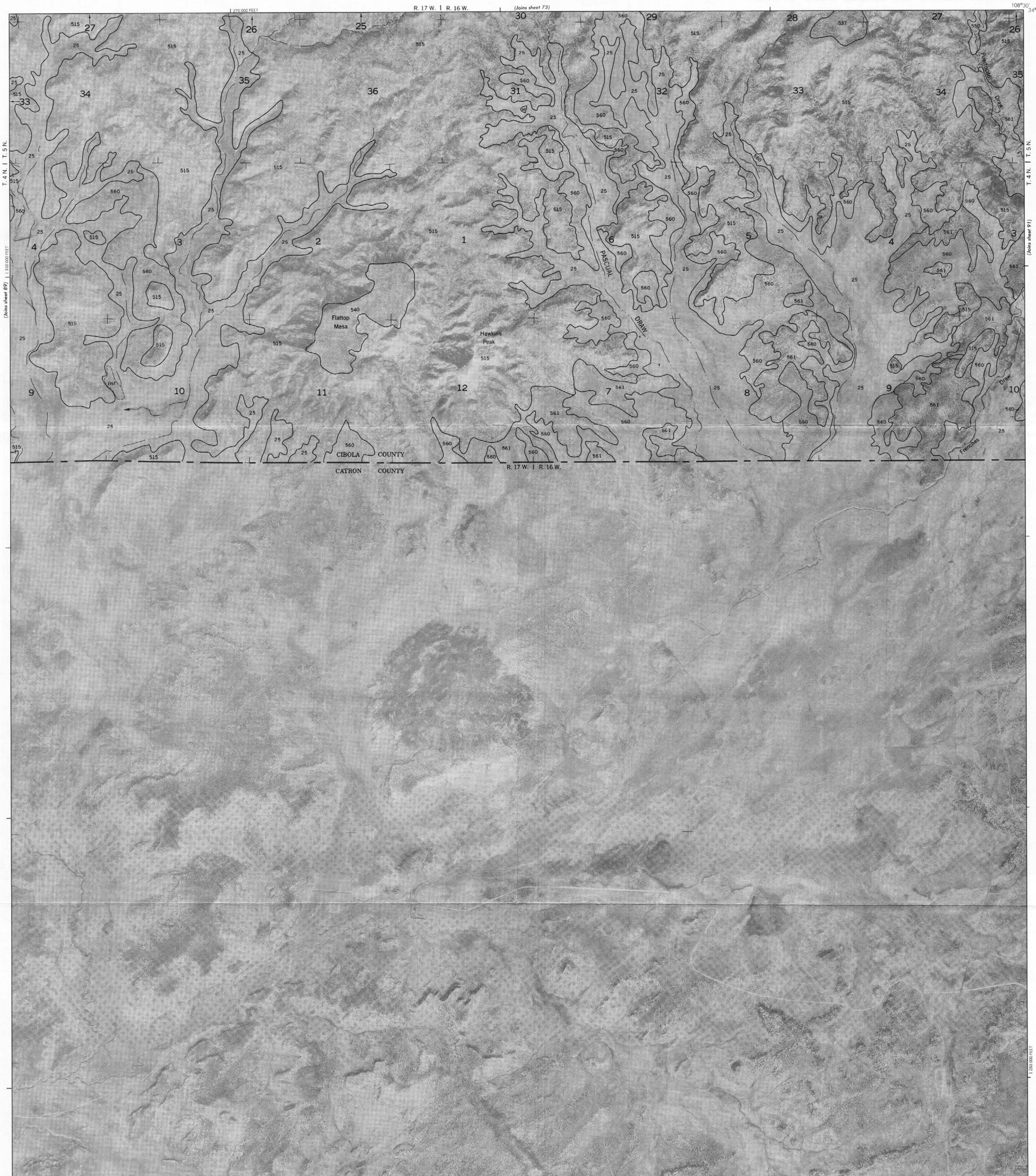
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 89

N



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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 90

N

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 91

N

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U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SHEET NUMBER 92
SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES

1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 92

N

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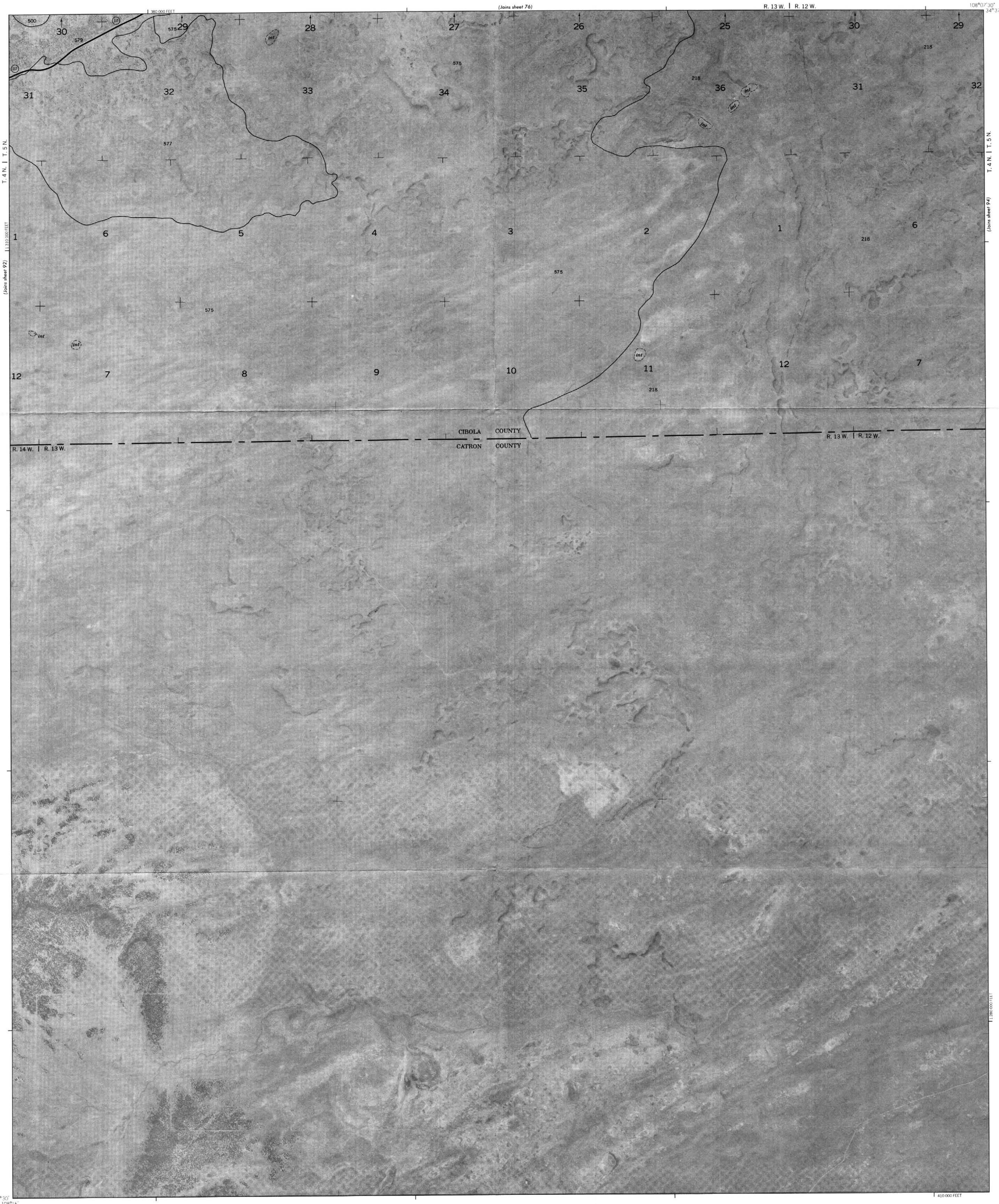
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

SOIL SURVEY OF CIBOLA AREA, NEW MEXICO,
PARTS OF CIBOLA, McKINLEY AND VALENCIA COUNTIES



1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 93

N

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 94

N

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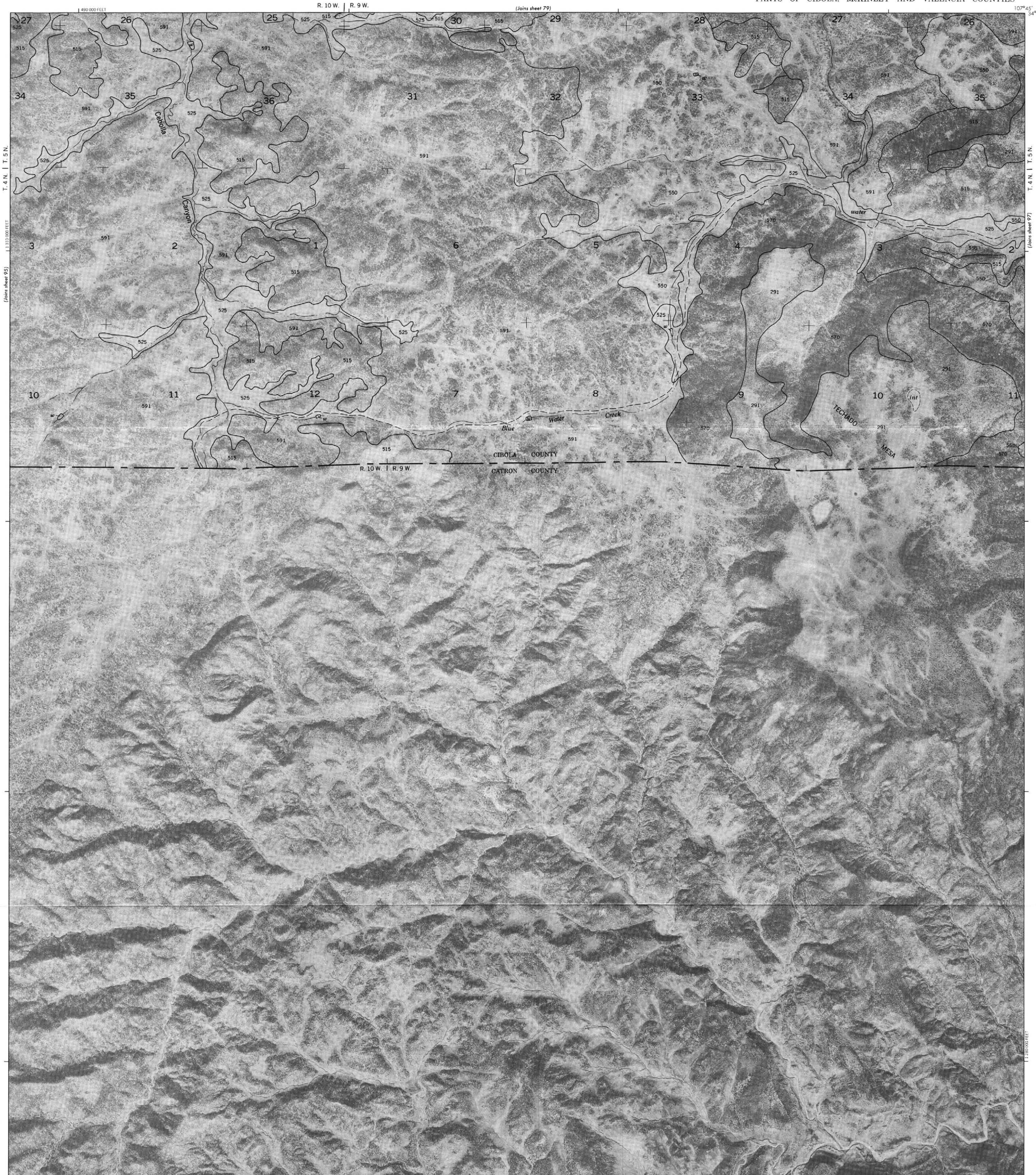
1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 95

N



1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 96

N

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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 97

N

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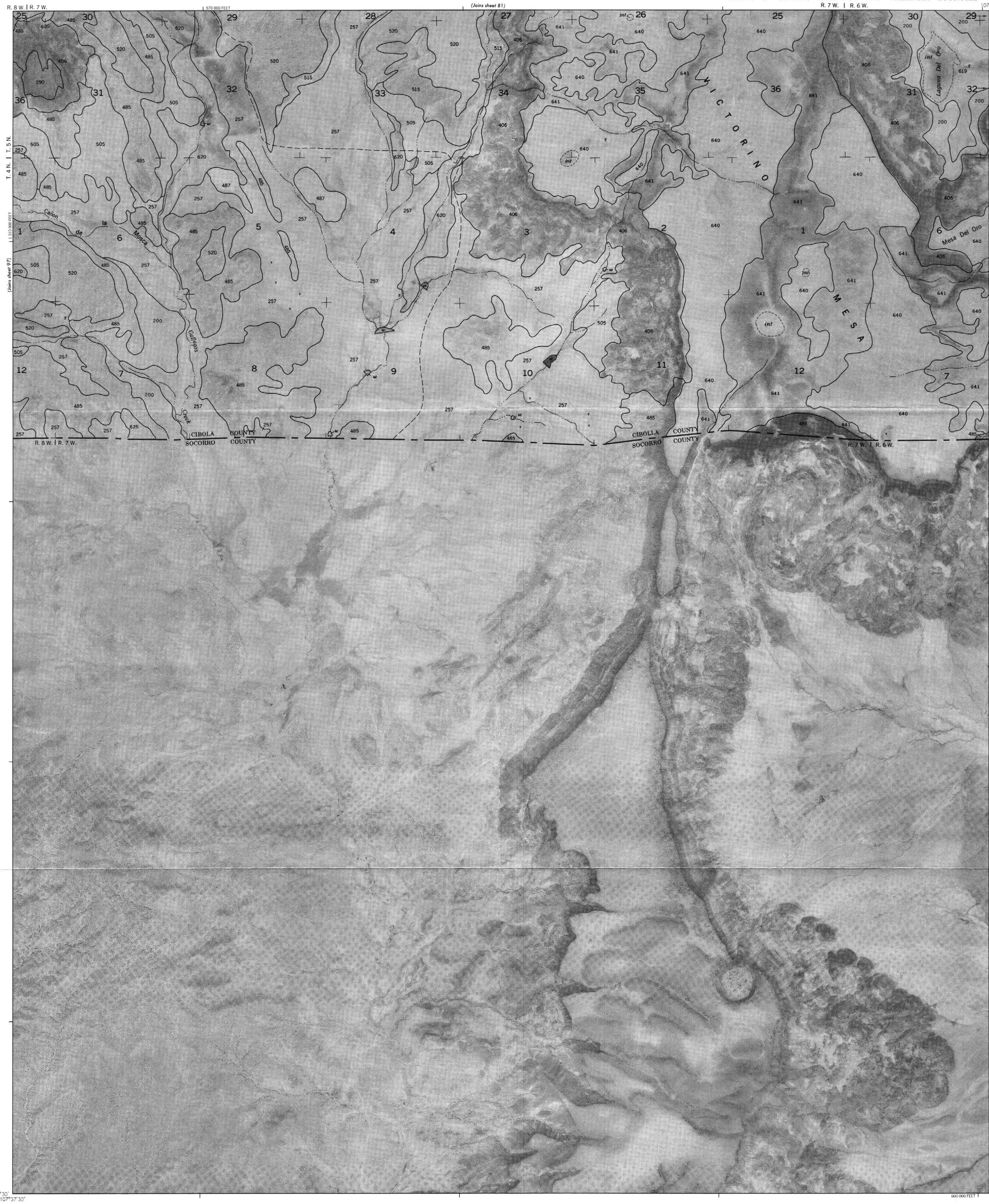

1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000
CIBOLA AREA, NEW MEXICO NO. 98

N

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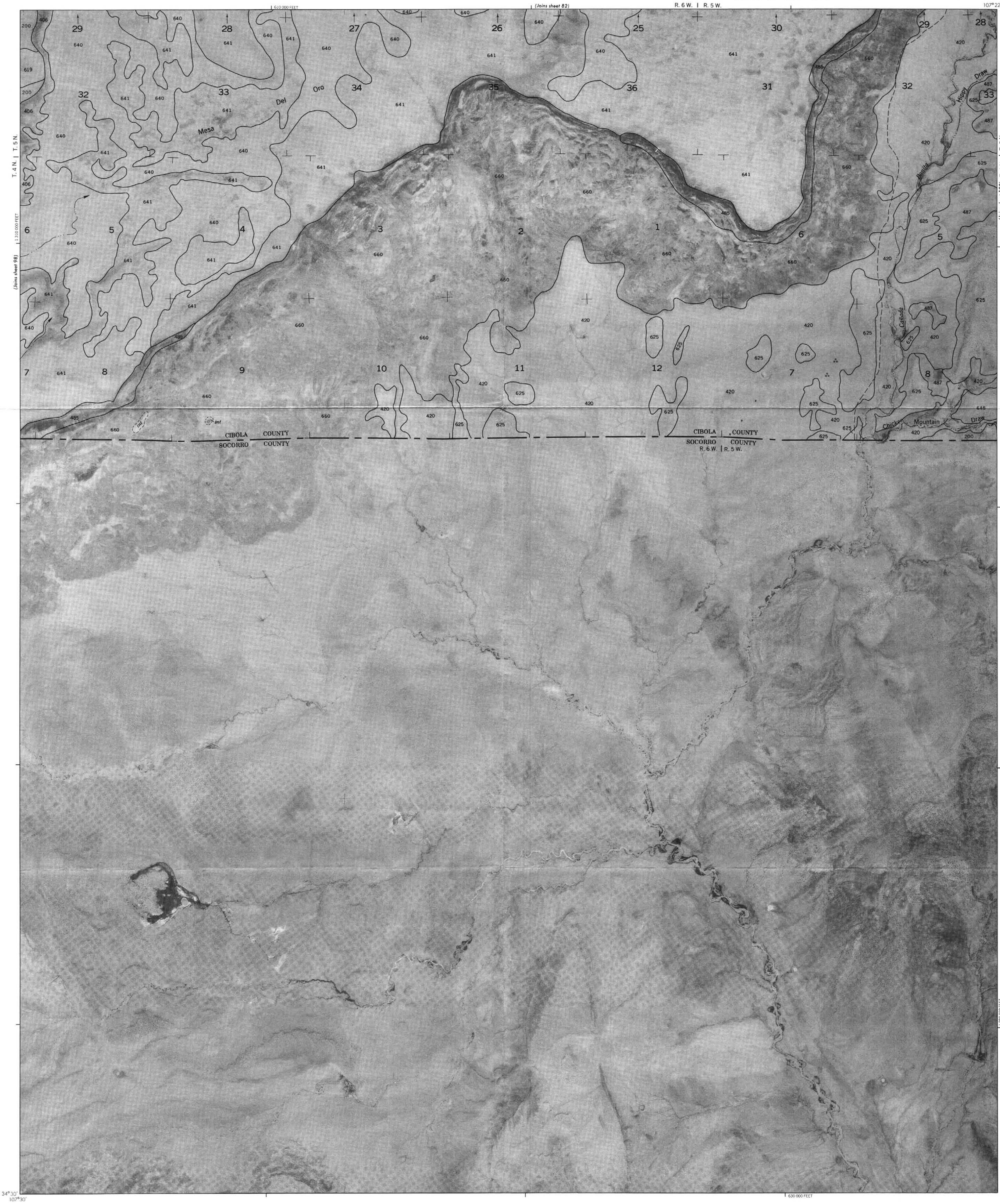
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



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1 3/4 1/2 1/4 0 1 2 MILES
1 0.5 0 1 2 KILOMETERS
SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 99

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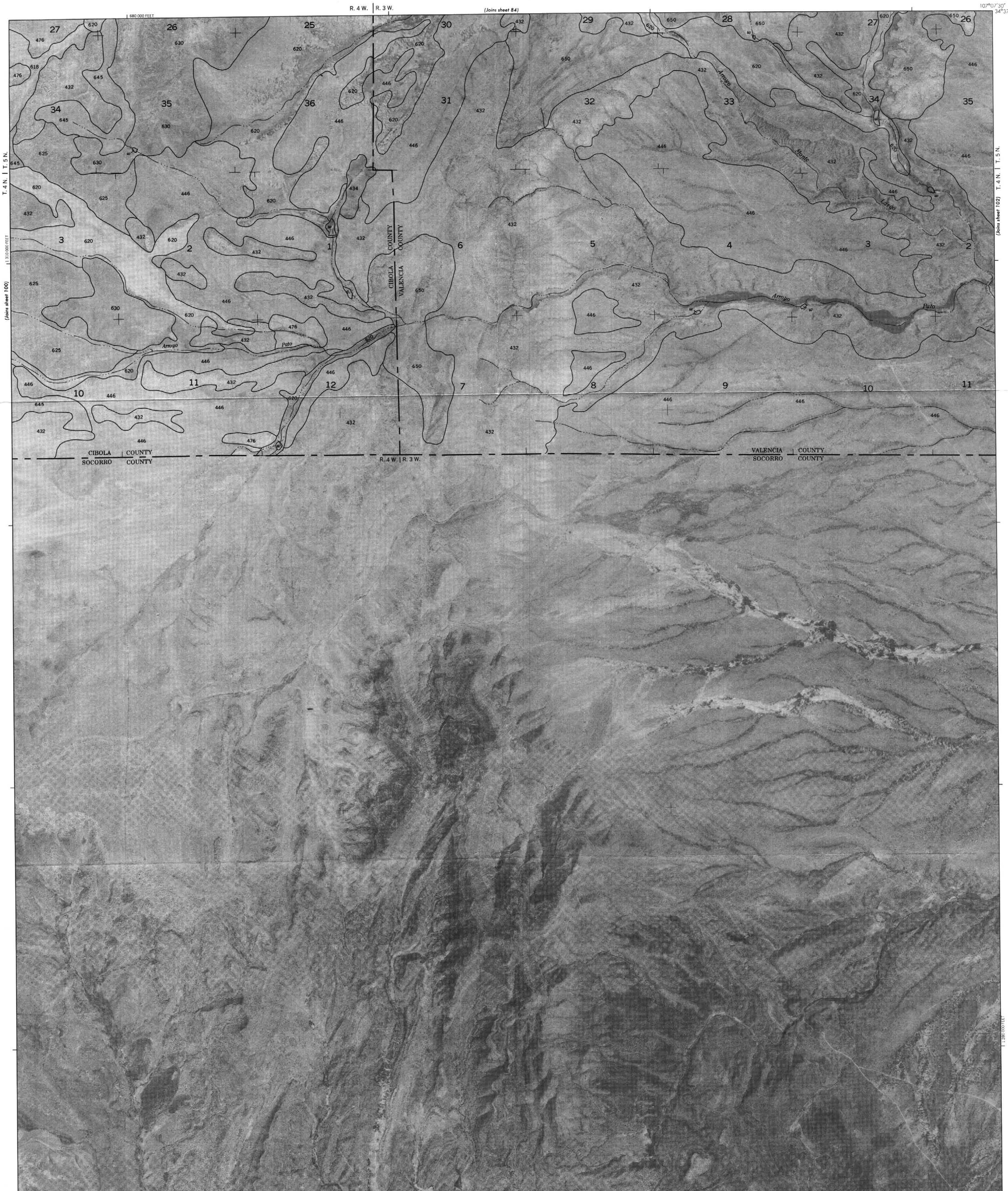
1 3/4 1/2 1/4 0 1 2 MILES

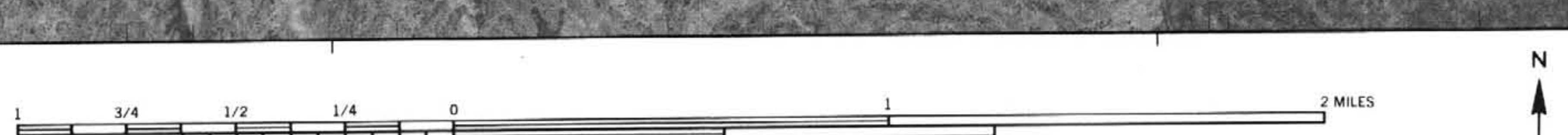
1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 100

N





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CIBOLA AREA, NEW MEXICO NO. 101

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1 3/4 1/2 1/4 0 1 2 MILES

1 0.5 0 1 2 KILOMETERS

SCALE 1:24 000

CIBOLA AREA, NEW MEXICO NO. 102

N